GRANULAR AGGREGATE RESOURCES

PETITCODIAC (NTS 21 H/14) MAP AREA, NEW BRUNSWICK

Open File Report 87-1

ISSN 0712-4562

NATURAL RESOURCES AND ENERGY
NEW BRUNSWICK

88-00854/

This report has been prepared by:

Minerals and Energy Division
Department of Natural Resources & Energy
Province of New Brunswick

Hon. Morris Green, Minister

1987

GRANULAR AGGREGATE RESOURCES

PETITCODIAC (NTS 21 H/14) MAP AREA,

NEW BRUNSWICK

Minerals and Energy Division

Department of Natural Resources and Energy

New Brunswick

Copies available by contacting:

Minerals and Energy Division,
Department of Natural Resources
& Energy
P.O. Box 6000, Fredericton, N.B.
E3B 5H1

Report No.: OFR 87-1

Authors: R.A. Brinsmead
A.A. Seaman

Cover: Tim Fevens
Catalogue No.:
ISSN 0712-4562

TABLE OF CONTENTS

	Page
Abstract	iii
Résumé	iv
Introduction	1
Location and Access	1
Previous Work in the Area	1
The Present Study	3
Physiography and Drainage	5
Physiography	5
Drainage	5
Geology	7
Bedrock Geology	7
Glacial Geology	8
Petitcodiac (west half)	8
Petitcodiac (east half)	13
Granular Aggregate Resources	14
Quality Limitations	14
Fine Particle Content	14
Grading	15
Physical Quality	15
Clast Coatings	16
Alkali-reactivity	16
Description of Map Units	17
Ablation Till	17
Ice-Contact Stratified Drift	18
Glaciofluvial Outwash	19
Ancient Alluvium	20
Major Sources of Granular Aggregate	21
Penobsquis	22
Crockets Corner	22
Springdale	24
Five Points	24
Smiths Creek	25
Mount Pisgah	27
Newtown	27
Knightville	28
Cornhill	29
Dubee Settlement	29
Havelock	30
Bennett Brook	30
Fawcett Hill	30
North River	30
River Glade	30
Forest Hill	31
Elgin	31
Little River	31
Other Sources of Aggregate	32

Table of Contents (cont'd) Page

Conclusions 32

References 34

ILLUSTRATIONS

Figure 1. Map showing the location of the study area ... 2
2. Physiography and drainage 6
3. Bedrock geology 8

Plate 86-222 ..... in pocket

ABSTRACT

The Petitcodiac (NTS 21 H/14) map area contains an estimated volume of workable granular aggregate material in excess of 26 million m^3. Most of this material is found in the extensive glaciofluvial ice-contact and outwash deposits in the valleys of Smiths Creek and the Kennebecasis River, located in the southwestern part of the map area. Approximately half of the material is of poor quality; the remainder is fair to good. There are no known sources of granular material suitable for high-specification usage in this area.

RÉSUMÉ

La région correspondant au feuillet topographique Petitcodiac (NTS 21 H/14) comprend plus de 26 million m^3 d'agrégat granulaire extractible. La plus grande partie de ce volume se retrouve au sud-ouest dans les importants dépôts de contact et d'épandages fluvio-glaciaires des vallées du ruisseau Smiths et de la rivière Kennebecasis. À peu près la moitié de ce volume est de pauvre qualité; le reste est de qualité passable à bonne. On n'a trouvé aucune source d'agrégat granulaire à haute spécificité.

INTRODUCTION

LOCATION AND ACCESS

The Petitcodiac (21 H/14) map area is located in southern New Brunswick, between the City of Moncton and the Town of Sussex (Figure 1). It is bounded by longitudes 65°00' and 65°30' West and latitudes 45°45' and 46°00' North, and covers an area of 1079 km^2. Petitcodiac and Havelock are the major communities within the area.

The area is traversed by the Trans-Canada Highway. A number of interconnecting Provincial highways and a network of local roads and logging roads provide good access throughout the area. Access to all of the significant granular aggregate deposits is good to excellent.

PREVIOUS WORK IN THE AREA

Aspects of the regional surficial geology of the Petitcodiac area were first described by Chalmers (1890) in his early work on the surficial geology of New Brunswick. More recently, the area has been covered by regional scale Quaternary geology mapping (Rampton and Paradis 1981). Limited information pertaining to surficial geology is also provided by the soil survey report covering the area (Aalund and Wicklund 1950). In addition, Hamilton and Carroll (1975), in their preliminary survey of the aggregate resources of the province, provided information on a number of aggregate extraction sites within

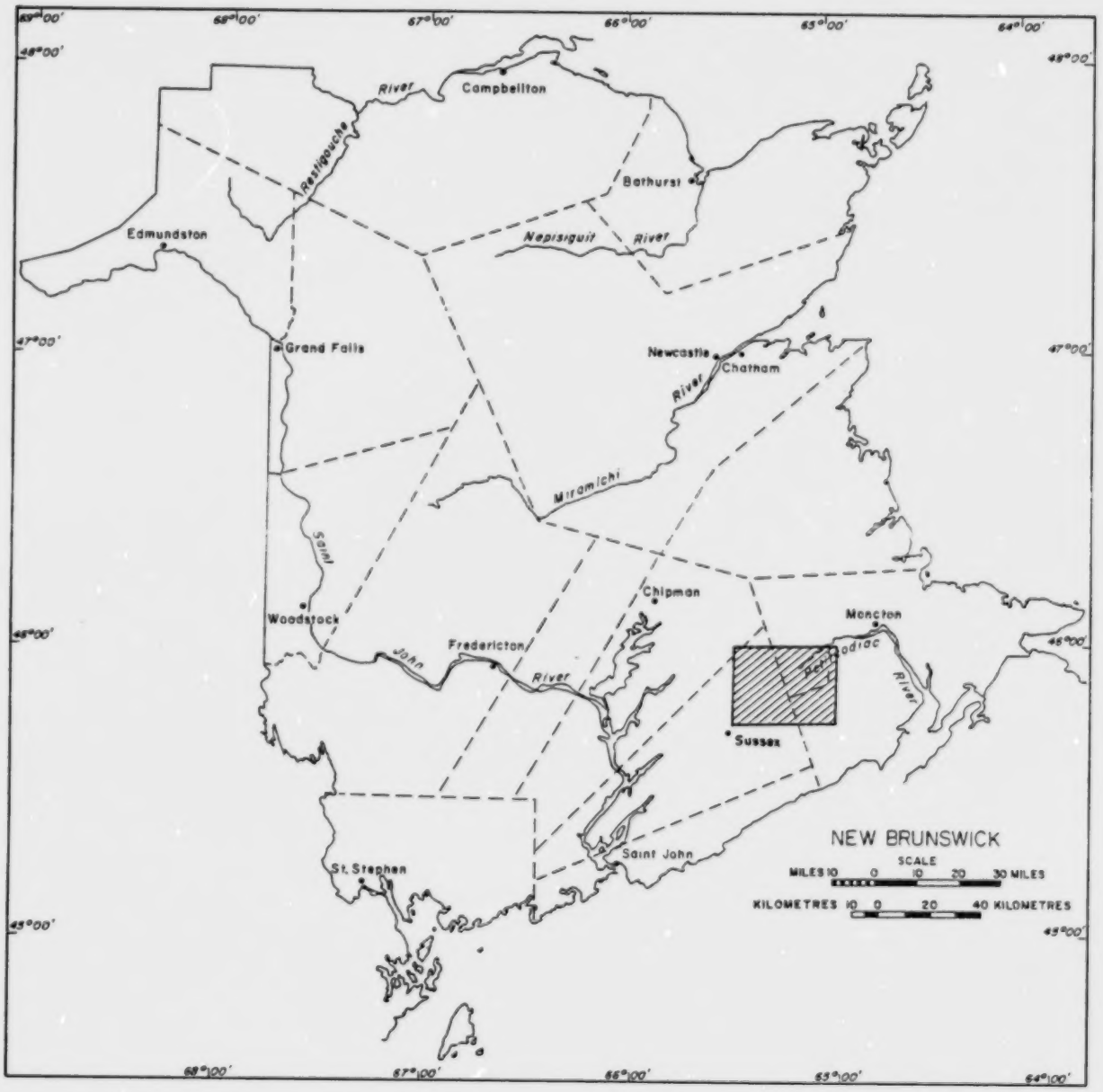

FIGURE 1. Map showing the location of the study area.

the study area. Information on aggregates at two sites in the eastern half of the area is provided by Kingston (1974) and ADI Limited (1975).

THE PRESENT STUDY

The objective of this study is to provide basic information pertaining to the location, extent, thickness, and quality characteristics of the granular aggregate deposits in the Petitcodiac map area. The aim is to make this information available to potential consumers of granular aggregates, and to planning organizations concerned with minimizing land-use conflicts and making efficient use of resources. This study is part of an on-going, province-wide inventory of granular aggregate resources.

Preliminary mapping of the surficial geology of parts of the east half of the area was carried out by R.A. Brinsmead during 1974. Aggregate mapping and evaluation was completed in this half of the area by A.A. Seaman in September, 1985. Field investigations in the western half of the area were carried out by R.A. Brinsmead during the summer of 1976.

Information leading to the determination of deposit boundaries and thicknesses was obtained by the examination of pit faces and other natural and man-made exposures. Some exposures were made or improved by the use of shovels and hand-augering equipment, and a hand-held power auger was used at a few locations. Heavy-duty power equipment was not available for

use, so observation of granular deposits at depth was accomplished only in pit excavations, limiting the accuracy of material thickness estimates. Where warranted, the materials were sampled for textural and lithologic analyses.

Average material depths used for volume calculations were usually arrived at by the projection of depths observed in pit excavations to areas beyond the pit boundaries, with the aid of geologic and topographic observations on the ground and from aerial photographs.

Brinsmead's work, funded by the Canada Department of Regional Economic Expansion, was previously published in the form of a preliminary map for Petitcodiac East (Brinsmead 1974) and a detailed aggregate report, with accompanying map, for Petitcodiac West (Brinsmead 1977). This report is a revision, by Seaman, of the previous report. It includes most of the detail presented in the earlier report, supplemented by some additional information from Brinsmead's field notes, and augmented by detailed aggregate resource information on the eastern half of the Petitcodiac map area. Similarly, the accompanying map is a redrafting of Brinsmead's Petitcodiac West map onto the current full-sheet base, plus the aggregate resources of Petitcodiac East as interpreted by Seaman. Time did not permit a re-evaluation of the western half of the map area; consequently, only the information on the eastern half of the area is current to 1985; that on the western half is current to 1976.

PHYSIOGRAPHY AND DRAINAGE

PHYSIOGRAPHY

The Petitcodiac map area lies within the Caledonian Highlands physiographic unit (Rampton et al. 1984). It is primarily within the Anagance Ridges subdivision, but does include small parts of the Moncton Basin and Central Plateau subdivisions, in its northeastern and southeastern corners, respectively (Rampton et al. 1984) (Figure 2).

The area is characterized by a valley and ridge topography, with a northeastward trend. The topography is substantially more rugged in the southern part of the area, adjacent to the core of the Highlands, where the rounded hilltops stand between 120 and 250 m above the valley floors. To the north, the land surface exhibits much less topographic variation.

DRAINAGE

The major drainage systems of the area occupy preglacial valleys deeply incised into the bedrock. Overall, the area exhibits the trellis drainage pattern characteristic of areas of valley and ridge topography (Rampton and Paradis 1981). Drainage is generally good.

The western half of the area lies within the Saint John River drainage basin (Figure 2). The Kennebecasis River and its tributary, Smiths Creek, drain southwestward parallel to the regional topographic and structural trends. Their tribu-

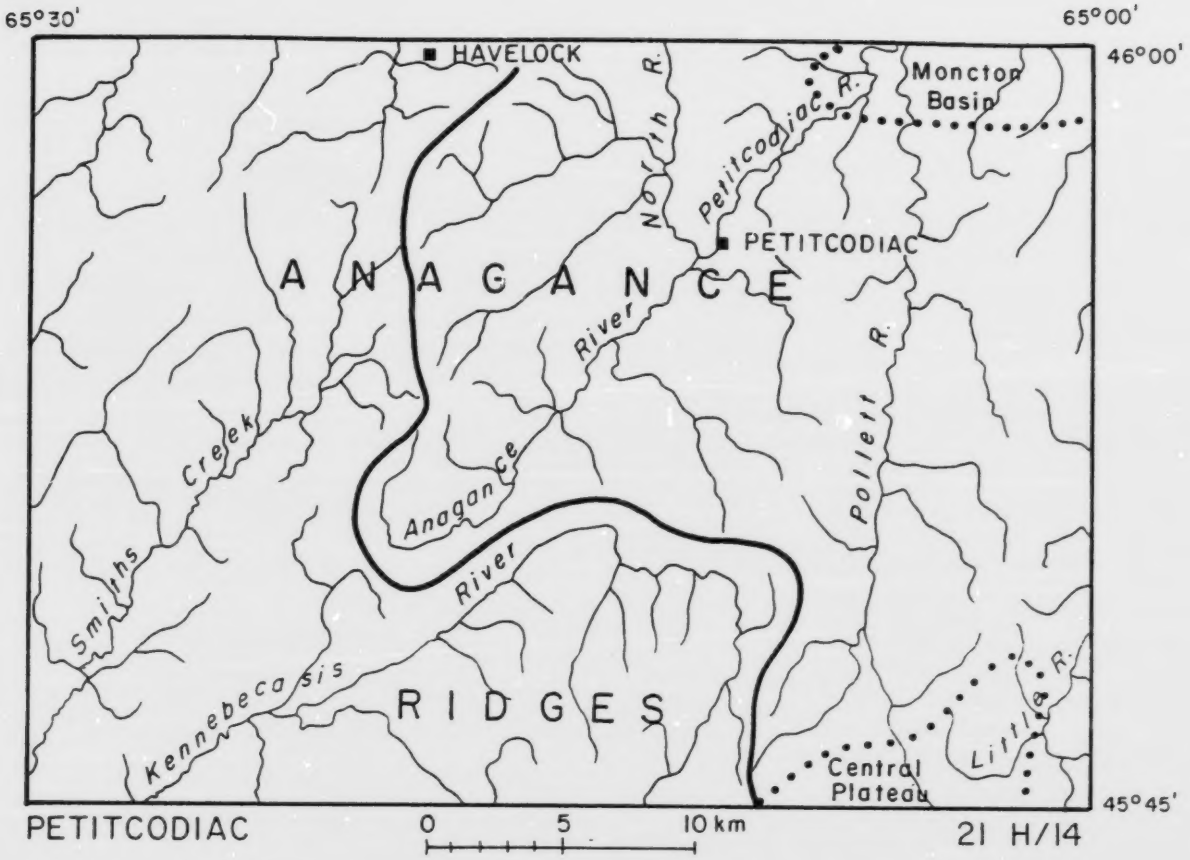

FIGURE 2. Physiography and drainage.

taries crosscut the dividing ridges to join the main streams. Several smaller streams in the northern part of the area, west of Havelock, drain northward into the Canaan River (outside of

the map area), which in turn drains southwestward to the Saint John River.

The eastern half of the area drains northeastward via the Petitcodiac River and its tributaries (Figure 2). The most important of these tributaries are the North, Anagance, Pollett, and Little rivers.

GEOLOGY

BEDROCK GEOLOGY

Bedrock units in the Petitcodiac map area range in age from Precambrian to Pennsylvanian or Permian (Figure 3). Most of the area is underlain by Carboniferous (Mississippian and Pennsylvanian) strata consisting of shale, sandstone, and conglomerate, either undeformed or only moderately deformed. In general, the less resistant units have been eroded to form valleys, the harder units remaining as ridges.

Also of Carboniferous age, but differing appreciably in character from the above clastic sedimentary rocks, are the rocks of the Windsor Group, comprising mainly limestone and gypsum. This unit underlies a substantial area around the Village of Havelock, and also occurs in narrow bands elsewhere in the study area.

Pre-Carboniferous rocks outcrop only in the southeastern corner of the map area, and in two small areas along its western edge. These rocks comprise a variety of sedimentary

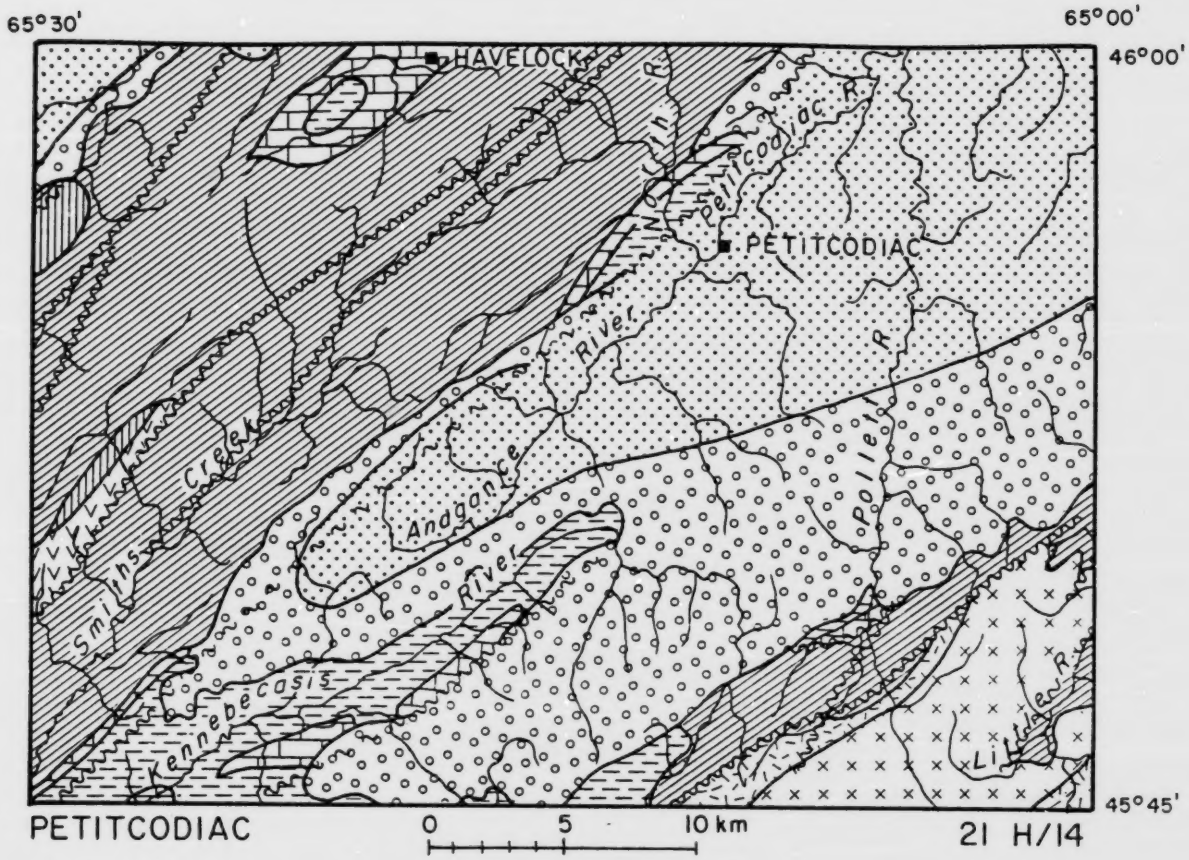

FIGURE 3. Bedrock geology (from Potter 1968; Ball et al. 1981; Stewart 194la, b).

and volcanic rocks (in many cases folded, faulted, and highly metamorphosed) intruded by igneous bodies that are younger and comparatively undeformed.

GLACIAL GEOLOGY

Petitcodiac (west half): Evidence in the western half of the Petitcodiac map area indicates a generally southward ice-movement. Ice-carved directional indicators such as striations

LEGEND

PENNSYLVANIAN and/or PERMIAN

grey sandstone, shale, and conglomerate

white to grey quartzose sandstone and quartz-pebble conglomerate

MISSISSIPPIAN and/or PENNSYLVANIAN

red conglomerate, sandstone, and shale

MISSISSIPPIAN

mainly limestone and gypsum

red to grey shale, sandstone, and conglomerate (in part petroliferous)

SILURIAN

felsic volcanics, tuffs

ORDOVICIAN and/or SILURIAN

interbedded sedimentary and volcanic rocks

PRECAMBRIAN or LOWER PALAEOZOIC

felsic to mafic intrusive igneous rocks

sedimentary and metasedimentary, volcanic and meta-volcanic rocks

SYMBOLS

~~~~~~~ fault; defined, assumed
~~~~~~~

and grooves were not encountered because of the nature of the work undertaken, but many occurrences of morainic and ice-contact stratified deposits lying against north-facing and northwest-facing slopes substantiate this concept. Esker remnants in the area exhibit an approximate north-south orientation, reinforcing the morainic evidence to a degree. Glacially carved indicators in the remainder of central southern New Brunswick, notably the Sussex map area (Brinsmead and Finamore 1977), offer convincing evidence of southward ice-movement in this region. The last glaciation of the area is assumed to have been of Wisconsinan age, by association with a limited number of dated deposits in the province.

A major ice-marginal position at the base of the southeast wall of the Kennebecasis River valley is marked by substantial morainic and ice-contact deposits. The volume of the deposits indicates a stance of the ice margin of considerable duration.

Subsequent to its melting out of the Kennebecasis River valley, the ice margin evidently established itself against the northwest-facing slope of the ridge to the north of the Kennebecasis River, the ice thus occupying the valley of the Anagance River. In this valley, the only deposits associated with this stance are some small ice-contact bodies located east of Dunsinane. Unlike the Kennebecasis stance, where there was no easy exit by which the meltwaters could carry away sediments, meltwater from the ice in the Anagance River valley issued through gaps in the dividing ridge at Stone Brook and Five

Points, into the now-flooded Kennebecasis River valley, carrying with it most of the sediment liberated by melting. The majority of the glaciofluvial deltaic deposits of the Kennebecasis River valley are thought to be of this origin.

Some evidence exists for a readvance of glacial ice into the Kennebecasis River valley, at least in the vicinity of Five Points. At sites H14-72 and H14-73, a till-like unit up to 0.3 m thick overlies up to 6 m of clean, horizontally bedded deltaic pebble gravel. The till-like unit is itself overlain by 0.9 to 1.8 m of massively structured coarse-pebble to medium-cobble gravel, an ablation-like unit whose sedimentological immaturity is marked by a high content of fine particles and an abundance of soft sandstone clasts. This upper unit records the melting-out of what was evidently a thin salient ice lobe extending from the main ice body in the Anagance River valley.

Large ice-contact features, including a well-developed double-crested end moraine at site H14-68, occupy both sides of the Smiths Creek valley in the vicinity of Smiths Creek settlement. The valley may for a time have been dammed by these deposits just above the present bridge at Smiths Creek. This complex may be comtemporaneous with the ice margin in the Anagance River valley, described previously.

No other major accumulations of ice-contact debris occur in the map area to indicate a long standing ice front. A few small ice-contact deposits farther up the valley of Smiths

Creek probably represent minor stances. Glaciofluvial deltaic deposits are abundant in this valley upstream nearly to Cornhill. These deposits characteristically comprise fine to silty fine sand at the base of the section, grading upwards through sand into pebble gravel high in the section. This sequence indicates deltaic deposition, probably from sediment-rich meltwaters flowing into lacustrine waters ponded behind a drift dam, or estuarine waters invading the local valleys during eustatic sea level adjustments. The estuarine hypothesis is favoured, indicating a maximum marine level contemporaneous with the presence of glacial ice.

Glacial readvance is also evident in the Smiths Creek valley. At various sites, from a location southwest of Newtown upstream to the vicinity of Cornhill, till is seen to overlie the deltaic sequence, with thin ablation gravels in turn overlying the till in some cases. This relationship can be observed in many of the gravel pits and road cuts. In addition, ice-contact deposits at H14-61 and H14-62 near Cornhill, thought to be esker segments, exhibit evidence of glacial overriding, indicating reactivation of stagnant ice.

Near Dubee Settlement, on the western boundary of the area, an esker occupies the valley of the upper reaches of Millstream River and Wright Brook, terminating at its southwest end in glaciofluvial outwash deposits. An ice margin is indicated at the downstream end of the esker, but this margin cannot be traced laterally. This esker also exhibits evidence of being overridden, having a rather wide, flattened form.

Very few significant recessional features were noted in the northwestern quadrant of the Petitcodiac map area, suggesting the lack of any long-term stances of the ice margin in this part of the area.

Petitcodiac (east half): As in the west half of the Petitcodiac map area, no directional indicators such as striations or grooves were encountered in the east half. However, Chalmers (1890) has reported northeastward-oriented striae in the northeastern part of the area, and north-northwestward-oriented striae in the southeast. The former striae orientation has also been observed in areas to the east and northeast (Seaman 1986). Rampton and Paradis (1981) imply that Chalmers' northward flow is incorrect, and is in fact southward. Strong indications of southeastward to southward flow have been found to the east (Seaman 1986) and, in preliminary work, in the Caledonian Highlands to the south of the Petitcodiac map area. Rampton et al. (1984) have suggested that the southward flow in the Caledonian Highlands was of pre-Late Wisconsinan age. However, it has not been possible to prove this, nor separate this early southward flow from supposedly later southward flows to the east and west. Hence, it is tentatively suggested that there was only one southward to southeastward flow, of Late Wisconsinan age.

The ice-contact deposit at site H14-2 indicates overriding by eastward-flowing ice. It is suggested that this indication of eastward flow, and the northeastward striae of Chalmers,

relate to a readvance of the ice during the general northwestward retreat noted by Brinsmead, which deposited till over glaciofluvial materials in the western half of the area. The northward palaeocurrent measured in the outwash at Elgin (H14-8), and the northward transportation of Caledonian clasts in the outwash deposits along the Pollett River, suggest that a late-stage ice cap may have persisted over the Caledonian Highlands. Much detailed work will be required to thoroughly evaluate the above proposals, and outline the true sequence of glacial events in this part of New Brunswick.

GRANULAR AGGREGATE RESOURCES

QUALITY LIMITATIONS

The quality of a granular aggregate material is dependent upon factors relating to the grain size characteristics of the material and to the lithologic composition of its component clasts. There are five major factors which serve to degrade the quality of an aggregate; two relate to texture, and three to clast lithology. These are: 1) an excessive fine particle content; 2) poor grading; 3) poor physical quality of clasts; 4) coatings on clasts; and 5) reactive character of clasts (i.e., alkali-reactivity in cement).

Fine Particle Content: A content of fine particulate matter (that material passing through a 75 um sieve) in excess of 5% in an aggregate is generally considered deleterious, and

for some usages, even lower percentages are specified (Bates 1969).

Fine particles may occur as discrete beds within a deposit, as coatings on larger clasts, as disseminated particles throughout a deposit, or as some combination of the above. If an aggregate contains fines in excess of the specified limits for a particular use, it may be upgraded to an acceptable level by washing, with an attendant significant increase in the cost of exploitation. However, in the first case above, this may be avoided by selective extraction of material.

Grading: Grading refers to the particle size distribution within the aggregate (i.e., the relative proportions of material in the different size categories). The natural grading of a deposit may be improved by crushing, by selective screening and recombination, or by the combination of materials from different sources or areas. However, such processing increases production costs. Excessive variability in the grading of a deposit can also lead to production problems.

Grading limits are specified by users (e.g., DOT), and will vary, depending upon the use of the material. Poor grading may restrict the potential of some deposits for certain uses.

Physical Quality: Ideally, clasts should be hard, strong, and durable. Soft materials such as shale, schist, and friable sandstones are unsuitable for use in most aggregates, since they disintegrate easily, while porous or fractured rock fragments may split due to the expansion of water as it freezes (Bates 1969).

Because most of the map area is underlain by sedimentary bedrock units, rock types such as siltstone, sandstone, and conglomerate occur abundantly in the granular deposits. This content of clasts that are commonly unsound is considered to be the most serious single quality limitation affecting local material.

Clast Coatings: The presence of silt, clay, carbonate, or oxide coatings on clasts renders them unsuitable for use in high-specification aggregate, since they weaken the bond between the clast and the cementing agent, and in concrete may become chemically unstable (Bates 1969). Silt and clay coatings may be removed by washing, with a consequent increase in the cost of exploitation.

Alkali-reactivity: Clasts that consist of opaline or cryptocrystalline silica react with the alkalies in cement. As a result of this reaction, the clasts expand, producing cracks within the concrete and making it susceptible to freeze-thaw and other destructive processes. The primary offenders are chert and some felsic extrusives (Bates 1969). In cases of suspected reactivity, the use of low-alkali portland cement or partial substitution of a pozzolanic material - such as fly-ash or finely ground siliceous material - for some of the cement is recommended (Bates 1969; Swenson 1973).

Although alkali-expansivity has not been documented by testing in this area, the use of aggregate having high concentrations of potentially reactive lithotypes in the making of

concrete is cautioned. Testing for such reactions would be necessary for total safety. Most of the lithotypes that are potentially reactive are present in the local deposits, in substantial quantities in some cases.

DESCRIPTION OF MAP UNITS

The major granular aggregate resources of the study area are found in deposits of four basic types. These are: 1) ablation till; 2) ice-contact stratified drift; 3) glaciofluvial outwash; and 4) ancient alluvium. A general description of each of these deposit types is presented below.

Ablation Till: Ablation till comprises the material that was carried into the terminal zone of a melting glacier by transport within or upon the ice, and then deposited onto the ground by means of sliding, flowing, or subsidence (Flint 1971). "The resulting till is therefore loose, noncompact, and nonfissile, and its clasts are less strongly abraded than those in lodgement till" (Flint 1971, p. 171).

Masses of ablation till occur in the map area as end moraines deposited against the southeast wall of the Kennebecasis River valley. The deposits are in the form of broad ridges built against the ice margin as it stood in the valley.

The ablation till consists of poorly sorted to largely unsorted material, usually containing, in significant percentages, component particles from the entire range of clast sizes

from clay through boulders. It may include pockets of better sorted ice-contact material.

Ablation till is considered to be of marginal quality due to its high content of fine particles. It is probably suitable for use as borrow or subgrade material, but not as higher specification aggregate in its pit-run state. Where the quality of this material is adequate for use as unspecialized aggregate, its use is recommended to conserve higher quality deposits. Beneficiation of deposits such as these by crushing and washing represents a good possibility for extending aggregate reserves in the future. Detailed exploration might outline reserves of higher quality material within areas of ablation till.

Ice-Contact Stratified Drift: Ice-contact stratified drift deposits are formed of sediment deposited by meltwater on or against glacial ice. Characteristically, such deposits form distinctive constructional landforms of various types.

Eskers are linear accumulations of sediment formed either by deposition from meltwater streams flowing in tunnels within a melting glacier (Flint 1971), or by deposition of a series of overlapping fans or "beads" at the point of stream discharge from a retreating glacier (Embleton and King 1975). Kames are mound-like hills, ranging from conical to irregular, formed from sediment that was washed into crevasses or other openings or depressions in the glacier surface and remained as mounds after the ice melted away; crevasse fillings are features of

similar origin that occur as short ridges (Flint 1971). Kame terraces consist of linear accumulations of sediment deposited by meltwater between an ice margin and a valley wall (Sugden and John 1976). Finally, kame moraines are ridges of glaciofluvial material deposited against the frontal margin of a glacier (Sugden and John 1976).

In general, ice-contact stratified drift deposits consist primarily of sand and gravel, with variable quantities of clay, silt, cobbles, and boulders. The sorting can range from very poor to good, while the texture commonly exhibits abrupt lateral and vertical variations. Such deposits, because of their deposition in contact with glacial ice, commonly display post-depositional deformation structures as a result of slumping subsequent to ice withdrawal. Because of their close association with the glacier, pockets of ablation or lodgement till may be present.

Glaciofluvial Outwash: Glaciofluvial outwash comprises the material that is deposited beyond the margins of a glacier by the action of meltwater streams. In general, this material consists of well-washed, horizontally stratified sand or gravel. Glaciofluvial outwash deposits usually exhibit a flat, gently sloping topography. As is typical with all stream deposits, clast roundness increases, and average particle size decreases, in the downstream direction (Flint 1971).

Where meltwater streams empty into standing bodies of water, outwash deltas are formed. Such deposits consist of a topset unit of outwash sand and gravel, overlying deltaic

foreset beds that are usually finer grained than the topset beds. The source of the constituent materials was glacial debris transported and sorted by meltwater streams issuing from ablating glacial ice nearby. During melting of the ice, the major valleys of the study area were inundated, presumably by estuarine waters as a result of a rise in sea level relative to the land mass. Meltwater streams entering this standing water in the valleys dropped their sediment load to build massive outwash deltas.

Much of the outwash mapped in the Petitcodiac map area is in the form of outwash deltas. Most of the deposits evident today are remnant terraces of what were probably continuous deltaic deposits at the time of deposition. Numerous exposures in these terraces exhibit a sediment sequence that is characteristically deltaic in nature. The base of a typical section comprises fine to silty fine sand with silt interbeds, grading upward through medium sand and pebbly sand into medium pebble to small cobble gravel near the surface. An excellent type section about 10 m high is located at a river cut to the south of the gravel pit at Site H14-51.

The upper, coarser units of this deltaic sequence represent one of the major aggregate resources in the map area, the material having a relatively low content of fine particles.

Ancient Alluvium: Alluvium consists of unconsolidated material that was deposited by the flowing water of streams or rivers during the postglacial period. Characteristically, the

material consists of horizontally stratified sand or gravel, although it may also contain a significant silt component (usually in the form of discrete beds, commonly at the surface of the deposit). Since much of the component material of these deposits is reworked from adjoining glaciofluvial deposits by fluvial erosion and redeposition, it thus shows evidence of greater sedimentological maturity, such as better rounding of clasts and a relatively high content of resistant lithotypes.

Ancient alluvial deposits occur as terraces in the major valleys in the map area, but stand at levels below those of the deltaic terraces. They are postglacial features, formed in association with a fluvial base level intermediate between the eustatic high level responsible for the positioning of the glaciofluvial deltas, and the present base level with which the modern alluvial river flats are associated. The ancient alluvial deposits were formed as the land mass was rebounding isostatically after liberation from the weight of glacial ice, and because they were not formed in the presence of glacial ice, do not comprise first-generation glaciogenic materials.

MAJOR SOURCES OF GRANULAR AGGREGATE

The major reserves of granular materials are described briefly in the following section. More detailed information on all these deposits, as well as for other numerically-referenced deposits, is recorded in summary form in the Appendices.

The deposits are grouped by geographic area, rather than by genetic similarity, as this system is probably most practical

to potential users. The bulk of reserves are concentrated in the valleys of the Kennebecasis River and Smiths Creek.

Penobsquis: An ice-contact deposit about 1.5 km southeast of Penobsquis contains large reserves of granular aggregate. A reserve estimate of approximately 3 million m^3 was arrived at after examination of exposures at two sample sites, H14-82 and H14-90, and the surrounding topography. The material may need upgrading for some uses. Exposure in the northeastern portion of the deposit is poor.

Large ablation till deposits southwest of Penobsquis appear to be genetically related to the ice-contact deposit described above, but the only good section exposes dirty, bouldery ablation till. Test-pitting of these deposits may reveal stratified material in places.

East of Penobsquis, near the confluence of the southern Branch with the main stream of the Kennebecasis River, the valley floor is covered by an extensive deposit of ancient alluvium. The deposit contains three gravel pits or pit complexes. The best exposure, at site H14-81, reveals about 4 m of clean gravel. Reserves are fairly large in the main deposit, and another smaller deposit across the South Branch Kennebecasis River from H14-81 may contain further reserves, although it was not evaluated due to lack of any suitable exposure.

Crockets Corner: An elongate ridge of granular material extending westward from Crockets Corner, lying between the main stream of the Kennebecasis River and its southern branch, is

interpreted to be a kame moraine. Several pits have been opened in this deposit, including sites H14-77, H4-79, and H14-80, which expose medium to coarse gravel that is slightly silty in places. Reserves are substantial, although cultural development removes much of the potential of the area as a gravel source. A deltaic terrace bordering this deposit on its northern side does not appear to have significant potential for gravel production because Highway 2 is constructed over much of its length. Another deposit interpreted as an ice-contact deposit lies south of the first deposit, across the South Branch Kennebecasis River. There are no exposures in this deposit, but it is thought to contain large reserves. Test-pitting is recommended.

North of the Kennebecasis River, coarse pebble gravel of a delta terrace is exposed in a pit at site H14-78. Reserves are small, a road having been recently built over the deposit east of the pit. A small esker segment lying northwest of this deposit also contains small reserves.

A pit at H14-76, just northeast of Crockets Corner, exposes a sizeable depth of deltaic coarse gravel. Extension of the pit to the east is restricted by a Provincial picnic area. The remainder of this deposit to the north of Highway 2, and east of the picnic area, is included in the reserve calculation.

Approximately 1 km east of this location, a test-pit at H14-88 exhibits about 3 m of fairly clean gravel. Reserves are moderately large, and include a portion of the ice-contact

deposit, and the area of deltaic gravel lying south of Highway 2. The relationship of the two deposits is obscure. Because of minimal exposure, reserves were not calculated for much of the eastern and southern parts of this ice-contact deposit. Further test-pitting could increase reserves substantially.

Pits at H14-84 and H14-85 are located in a delta terrace southeast of Crockets Corner along Highway 114. Reserve calculations for these locations are restricted to limited areas around the pits, the southeastern limit being a terrace intersecting the road about 300 m southeast of the pit at H14-84.

Springdale: The deltaic deposit mentioned above continues southeastward up the valley of the South Branch Kennebecasis River about 1 km above Springdale. Site H14-86, in the southernmost widening of this deposit, exposes a 6 m face of gravel characterized by coarse cobbly texture at the surface. The deposit thickness probably decreases toward the valley wall. The downstream portion of the deposit, from Springdale to the previously mentioned terrace southeast of H14-84, is poorly exposed, but is estimated to contain a large volume of material (see H14-84). Significant reserves of aggregate are also present in the ancient alluvial deposits adjacent to H14-86. The total volume of aggregate in the Springdale area is estimated at approximately 1.5 million m^3.

Five Points: Material at site H14-91, about 2 km south of Five Points, is untested due to the lack of a suitable exposure. The deposit appears to be a kame terrace, with

reserves conservatively estimated at 1.7 million m^3. A deposit extending southwestward from H14-91 may be an end moraine, and is mapped as ablation till. The material was not observed at depth, however, and test-pitting may indicate granular materials in this area also. No reserve figure is suggested for this questionable deposit.

Limited reserves remain at site H14-72, immediately south of the Five Points intersection, the pit area being confined by roads and a depleted pit lying to the east. A further area of about 9 ha north of the side road may have workable resources, but its boundaries are uncertain, and the material depth used in calculating the reserves is only an estimate. In the eastern extremity of this deltaic deposit, reserves of about 280 000 m^3 of material are estimated in the vicinity of site H14-73, where an excellent exposure was available in a pit face about 7.5 m in height.

Site H14-75, 1.5 km directly east of Five Points, exposes gravel at the top of a delta terrace 4.5 m or more in height. In the portion of this deposit extending southwestward to its extremity and northeastward about halfway to H14-87, estimated reserves of 1.5 million m^3 exist. In the vicinity of site H14-87, reserves estimated for the remainder of this deltaic deposit amount to 1.7 million m^3.

Smiths Creek: A pit at site H14-68, 0.8 km northwest of Smiths Creek settlement, exposes variable sandy gravel and silty sand, till-capped, in a face about 6 m high. This

distinct, double-ridged kame moraine extends northwestward for about 1.2 km, encompassing reserves estimated at 500 000 m^3.

The deposit immediately northeast of H14-68 is not so distinct topographically, and is difficult to outline conclusively. The main subsurface exposure is the pit at H14-67, with a 6 m face consisting almost entirely of sand and silty sand. Till is observed locally at the surface within the deposit boundaries, but this may be only a capping unit. Reserves of 270 000 m^3 are estimated for a conservatively outlined portion of the deposit northeast of Highway 890, around the pit.

The reserve estimate of 220 000 m^3 for H14-69, lying 1.5 km northeast of Smiths Creek settlement, includes a little less than half the area of the deposit in which the pit lies. Reserves of 430 000 m^3 are expected in the remainder of the deposit, in the area of site H14-70. Both pits expose ice-contact stratified material that is characteristically variable in grain size, comprising clean to silty gravel, sand and silty fine sand. Clast quality is rather poor.

The ice-contact deposit, centred about the community of Smiths Creek and extending about 1.5 km to both the northeast and southwest, contains no pits and few exposures. The material is expected to be similar to that encountered at H14-69 and H14-70. An average depth of only 1.8 m was assumed, but the large area of the deposit results in estimated reserves of about 1.5 million m^3 of low-quality material.

At site H14-65, about 3 km north of Smiths Creek settlement, a small pit exposes 2.5 m of ice-contact pebbly coarse sand to fine gravel. Similar or slightly coarser material comprises the deposit across the valley to the east of H14-65. Total reserves of 320 000 m^3 are estimated in the two deposits.

Mount Pisgah: About 1.5 km west of the settlement of Mount Pisgah, a delta terrace parallels the east bank of Smiths Creek for a distance of at least 2.5 km. The best exposure, a river cut near the southern limit of the deposit, exposes at least 2.4 m of gravel overlying fine sand. The deposit is estimated to contain reserves totalling 360 000 m^3.

Newtown: Several small ice-contact deposits occur southwest of Newtown. Site H14-52 has very small reserves that are probably unexploitable because of residential development. A pit at site H14-53 has faces up to 5.5 m high, but the small size of the deposit limits reserves to about 50 000 m^3. Reserves of about 130 000 m^3 are estimated at H14-54, where fairly coarse, silty gravel is exposed in a 13.7 m face. An adjacent delta terrace east of this location has probable reserves of about 150 000 m^3.

A large deltaic deposit at Newtown contains three gravel pits, for which reserves are calculated separately. About 4.5 m of medium gravel is exposed at H14-55. Reserves of approximately 1.1 million m^3 are estimated in a large area surrounding the pit and in an area west of Highway 890. No subsurface exposures were available other than the pit, so backhoe testing

is advised to prove up this figure. Good depths of material are evident at H14-56 and H14-57 as well, but smaller workable areas limit the reserves at these locations.

Knightville: About 2.5 km west of Knightville, a pit at site H14-63 exposes sandy gravel on a terrace up to 7.5 m high. The boundaries of the deltaic deposit in this area are uncertain because of the presence of a till unit of variable thickness overlying the gravel, so a very limited area has been used in the reserve calculations. Systematic testing might increase the reserve figure considerably.

Just to the northeast of this location, a river cut at H14-64 exposes about 2.4 m of deltaic gravel. The area of the deposit is small, with limited reserves. There is no access at present.

A pit at site H14-51, at the southeast corner of Highway 890 and the road leading to Knightville, exposes glacially overridden deltaic gravel in faces up to 3.4 m high. A substantial area west and north of the pit is underlain by gravel, with reserves estimated at 940 000 m^3.

About 2.5 km southwest of Knightville, a small ice-contact deposit lies against the hillside, most of it being east of the road. Average material depth is not great, and a substantial portion of the aggregate has already been removed. Reserves are limited.

At site H14-50, 2.5 km northwest of Knightville, a pit exposes up to 3 m of sediment, the upper 1.2 to 1.8 m being

till, with gravel and gravelly sand beneath. Several other exposures in the southern part of the deposit indicate that additional gravel might be expected below the pit floor. The deposit covers a wide area, although the position of the northern boundary is uncertain because of the till cap. Reserves are estimated at approximately 2.5 million m^3.

Cornhill: Silty gravel or gravelly till is exposed in an overgrown 1.8 m pit face at site H14-58. The location of both the northern and southern boundaries of this deposit are uncertain, as is the case with deposit H14-50, resulting in a low level of confidence in the accuracy of estimation of material volume. A reserve figure of about 1.8 million m^3 is suggested.

A pit at site H14-62, 0.8 km west of Cornhill, exposes interbedded gravel and till in a glacially overridden esker remnant. Reserves of low-quality material total about 80 000 m^3. Similar material is found at H14-61, about 1.5 km southwest of the Cornhill intersection, where reserves are estimated at about 380 000 m^3.

At site H14-59, a short distance south of the previous location, about 2.4 m of deltaic gravel is exposed in a pit face. Reserves are approximately 75 000 m^3.

Dubee Settlement: Up to 3.7 m of coarse gravel is exposed at site H14-89, at the southern end of an esker segment near Dubee Settlement. Reserves in this deposit and in two adjacent small glaciofluvial outwash bodies are estimated at 340 000 m^3.

Havelock: Outwash gravel is visible in a 1.8 m face at site H14-66, about 1.5 km west of Havelock. The deposit is partly worked out, with limited reserves remaining.

Bennett Brook: The outwash deposit at Bennett Brook (H14-3) exposes material ranging from silty sand to sandy gravel. Till has been observed both overlying and underlying the aggregate materials. Reserves are estimated at 200 000 m^3.

Fawcett Hill: An ice-contact deposit, buried by till, is present to the southeast of Fawcett Hill (H14-2). Fine aggregate is predominant, locally with excessive fines. Recoverable reserves are estimated at 510 000 m^3.

North River: Recoverable reserves of 140 000 m^3 are estimated for the outwash deposit along the North River, north of Fawcett (H14-1). The material is predominantly a gravelly sand. Most of the remaining reserves lie to the east of the river.

Limited reserves of borrow-quality material are present in a small ancient alluvial deposit to the south of Intervale.

River Glade: A large outwash surface is present at the confluence of the Petitcodiac and Pollett rivers, near River Glade. The material in this area varies from gravelly sand through to relatively fine sandy gravel (H14-4). Although the deposit area is extensive, workable reserves are considered to be limited, since most of the deposit has a very high water table and most of the workable portions of the deposit have been depleted.

Limited reserves of moderately good quality gravel of similar origin are present at The Glades, to the south along the Pollett River (H14-5).

Forest Hill: Approximately 200 000 m^3 of relatively poor quality sandy gravel are present in a kame at Forest Hill (H14-6). Some of the material in the deposit is till-like in character.

Elgin: A terraced outwash delta is present along the Pollett River at Elgin (H14-8). The material varies from sand through to gravel. Most of the deposit area has been either depleted or sterilized by cultural developments. Remaining workable reserves are estimated to be 320 000 m^3.

A deposit of similar character and possible similar origin is present to the south at Churchs Corner (H14-9). Workable reserves are limited.

Little River: A series of small esker segments extend along the Little River valley, in the southeastern corner of the map area (H14-10, 11). The material in these deposits is typically variable in texture, but is of generally good quality. Reserves are limited in each individual esker segment.

Large areas of ancient alluvium are present along the Little River valley. These deposits tend to have shallow workable thicknesses, and thus have only limited aggregate potential. They are best reserved for agricultural usage.

OTHER SOURCES OF AGGREGATE

Although bedrock sources were not tested in this study for their potential to produce crushed aggregate, this does represent a possible resource for the future. The Carboniferous clastic sedimentary rocks comprise vast quantities of low-quality crushable material that could be used as fill. The weathered upper few metres of these rocks can often be excavated by conventional loading equipment, and is locally used as source of aggregate.

The metamorphosed sedimentary and volcanic rocks and associated intrusive igneous bodies, of pre-Carboniferous age, have potential for the production of higher quality aggregate materials. High-quality aggregate can also be produced by crushing the Carboniferous Windsor Group limestones. This limestone is extensively quarried in the Havelock area. Some of this material is used for road aggregate, but the major use is as a source of more valuable lime.

CONCLUSIONS

Total granular aggregate reserves in the Petitcodiac map area are conservatively estimated at more than 26 million m^3. Of this amount, 95% is located in the western half of the map area, primarily in the Smiths Creek and Kennebecasis River valleys. Estimated reserves are about 11 million m^3 in the former valley; about 14 million m^3 in the latter.

At present, no local sources are known to be of a quality adequate for the production of specification concrete aggregates. Local demand is probably not large enough in any case to justify a major search for high-specification aggregates, or the beneficiation of substandard materials. Aggregate for specification concrete work is presently imported, a practice that is likely to continue for some time.

Bedrock units might provide a source of high-specification aggregate, but development of these resources would probably require establishment of a permanent plant, which is not justified by the limited local demand. Material from the Havelock Lime quarry, just north of the map area, probably suits concrete and asphalt specifications, but is subject to polishing when used in asphalt.

REFERENCES

AAULUND, H. and WICKLUND, R.E. 1950. Soil survey report of southeastern New Brunswick. Third Report of the New Brunswick Soil Survey, Dominion Department of Agriculture, 108 p.

ADI LIMITED. 1975. Southeastern New Brunswick sand study. Report submitted to the Department of Economic Growth, Province of New Brunswick, 59 p.

BALL, F.D., SULLIVAN, R.M., and PEACH, A.P. 1981. Carboniferous Drilling Project. New Brunswick Department of Natural Resources, Mineral Resources Division, Report of Investigation 18, 109 p.

BATES, R.L. 1969. Geology of the industrial rocks and minerals. Dover Publications, Inc., New York, New York, 459 p.

BRINSMEAD, R.A. 1974. Surficial geology and granular resources of Petitcodiac East (21 H/14E). New Brunswick Department of Natural Resources, Mineral Resources Branch, Plate 74-121 (Preliminary).

_____ 1977. Aggregate resources of Petitcodiac West map area (21 H/14W). New Brunswick Department of Natural Resources, Mineral Resources Branch, Topical Report 77-7, 70 p.

BRINSMEAD, R.A. and FINAMORE, P.F. 1977. Aggregate resources of the Sussex map-area (21H /12) and part of the Hampstead map-area (21 G/9E), including surficial geology of Sussex

East (21 H/12E). New Brunswick Department of Natural Resources, Mineral Resources Branch, Topical Report 77-8, 115 p.

CHALMERS, R. 1890. Report on the surface geology of southern New Brunswick to accompany 1/4 sheet maps 1 S.W., 1 S.E., and 1 N.E. Geological and Natural History Survey of Canada, Annual Report, Volume IV (1888-1889), Part N, 92 p.

EMBLETON, C. and KING, C.A.M. 1975. Glacial geomorphology. Edward Arnold (Publishers) Ltd., London, 573 p.

FLINT, R.F. 1971. Glacial and Quaternary geology. John Wiley and Sons, Inc., New York, New York, 892 p.

HAMILTON, J.B. and CARROLL, D.J.J. 1975. Sand and gravel in New Brunswick. New Brunswick Department of Natural Resources, Mineral Resources Branch, Report of Investigation No. 16, 107 p.

KINGSTON, P.W. 1974. Granular aggregate resources of the Moncton-centered region - summary. New Brunswick Department of Natural Resources, Mineral Resources Branch, Topical Report 74-7, 9 p.

POTTER, R.R. 1968. Provisional geological map, Amherst. New Brunswick Department of Natural Resources, Mineral Resources Branch, Plate 68-11.

RAMPTON, V.N. and PARADIS, S. 1981. Quaternary geology of Amherst map area (21 H), New Brunswick. New Brunswick Department of Natural Resources, Mineral Development Branch, Map Report 81-3, 36 p.

RAMPTON, V.N., GAUTHIER, R.C., THIBAULT, J., and SEAMAN, A.A. 1984. Quaternary geology of New Brunswick. Geological Survey of Canada, Memoir 416, 77 p.

SEAMAN, A.A. 1986. Granular aggregate resources of southeastern New Brunswick. New Brunswick Department of Natural Resources and Energy, Mineral Resources Division, Open File Report 86-12, 89 p.

STEWART, J.S. 1941a. Geology, Petitcodiac (East Half), Kings, Westmorland, and Albert counties, New Brunswick. Canada Department of Mines and Resources, Map 642A.

_____ 1941b. Geology, Petitcodiac (West Half), Kings and Westmorland counties, New Brunswick. Canada Department of Mines and Resources, Map 643A.

SWENSON, E.G. 1973. Alkali-expansivity of some concrete aggregates in Nova Scotia. Atlantic Industrial Research Institute, Nova Scotia Technical College, Halifax, Nova Scotia, 23 p. and Appendices.

SUGDEN, D.E., and JOHN, B.S. 1976. Glaciers and landscape, a geomorphological approach. Edward Arnold (Publishers) Ltd., London, 376 p.

APPENDIX A

SITE DESCRIPTIONS OF

PETITCODIAC MAP AREA (EAST HALF)

21 H/14E

LOCATION:	H14-1	**NTS:**	21 H/14E
TYPE OF DEPOSIT:	Glaciofluvial outwash	**COUNTY:**	Westmorland
EXPOSURE TYPE:	Pit	**PARISH:**	Salisbury
STATUS:	Abandoned	**UTM:**	293 959

SECTION DESCRIPTION & COMMENTS:

0.5 m Soil: Iron-rich; developed on the underlying material.

1.2 m Sand: Interbedded medium sand and gravelly medium to coarse sand; the bedding dips northward.

0.7 m Slump Covered: Assumed to be material as above.

Samples from this site analysed by DOT (1958) provided similar results: 99.0% passing 4.75 mm, 2.7% passing 75 µm; and 96.0% passing 4.75 mm, 0.2% passing 75 µm. DOT (1958) sampled another area of the deposit, to the northeast between the railway and the North River. The material here was a coarser gravelly sand: 75.4 to 78.4% passing 4.75 mm; 0.4 to 1.9% passing 75 µm. The Los Angeles abrasion loss was 24.5%.

Most of the reserves in this deposit lie in the area on the east side of the North River.

The small area of ancient alluvium, along the North River, south of Intervale, was also sampled by DOT (1958). Their results were as follows:

(CONTINUED)

MECHANICAL ANALYSIS:

sieve		25mm	19mm	9.5mm	4.75mm	2.36mm	1.18mm	600µm	300µm	150µm	75µm
% pass.				100.0	97.8	92.7	84.9	61.4	15.9	1.6	1.0

LITHOLOGIC ANALYSIS: N.A.

Unsound Lithotypes	%	Sound Lithotypes	%

ESTIMATION OF RESERVES:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (metres)	Recoverable Reserves (m^3) Probable
48	14	1	140 000

LOCATION #: H14-1 (cont'd)

Mechanical Analysis: fine aggregate (1 sample)
100% passing 4.75 mm; 1.2% passing 75 µm

coarse aggregate (12 samples)
22.7 to 55.9% passing 4.75 mm (average 43.1%);
0.1 to 1.2% passing 75 µm (average 0.5%)

Los Angeles abrasion loss: 24.7 to 40.1%

Recommended for use as borrow only.

Reserves in this deposit are limited.

LOCATION:	H14-2	**NTS:**	21 H/14E
TYPE OF DEPOSIT:	Ice-contact	**COUNTY:**	Westmorland
EXPOSURE TYPE:	Pit	**PARISH:**	Salisbury
STATUS:	Active	**UTM:**	284 940

SECTION DESCRIPTION & COMMENTS:

Section A (north face, east end of pit)

0.2 m Till: Dense, reddish brown sandy till; contains some large striated boulders; the till has been largely removed; estimated thickness is 1 m.

5.0 m Sand and Sandy Gravel: Interbedded medium to very coarse sand, and very fine to medium gravel with fine to coarse sand; clasts are subrounded to rounded; maximum clast size is less than 0.1 m.

Section B (north face, west end of pit)

- Till: Removed.

1.4 m Sand: Interbedded sand and gravelly sand, similar to the material in Section A.

6.3 m Sand and Silt: Interbedded material ranging from clayey silt through to clean, manganiferous medium sand; beds dip southwestward.

(CONTINUED)

MECHANICAL ANALYSIS:

sieve		25mm	19mm	9.5mm	4.75mm	2.36mm	1.18mm	600µm	300µm	150µm	75µm
% pass	A	98.2	95.9	88.8	78.1	61.0	46.1	27.9	12.1	5.4	3.4
	B		100.0	99.5	99.5	99.4	99.3	98.6	91.6	71.3	46.8

LITHOLOGIC ANALYSIS:

Unsound Lithotypes 30%	Sound Lithotypes 70%
sandstone 23; mafic intrusive 2; felsic intrusive 1; mafic extrusive 1; shale 1; weathered 1	felsic extrusive 23; felsic intrusive 12; mafic extrusive 9; sandstone 6; metasedimentary 6; gneiss 4; metavolcanic 3; quartzite 3; mafic intrusive 2; siltstone 2

ESTIMATION OF RESERVES:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (metres)	Recoverable Reserves (m^3) Probable
17	17	3	510 000

LOCATION #: H14-2 (cont'd)

Most of the material in the pit area and in test pit exposures appears similar to that in Section A. The fine material appears to be present only in the core of the deposit. Glaciotectonic deformation structures beneath the capping till indicate an ice advance toward the east.

This deposit has been extensively tested by DOT (1984). The results of these tests are as follows (based on 31 samples):

Mechanical Analysis:
63 to 99% passing 4.75 mm (average 81%);
2.9 to 38.1% passing 75 μm (average 7.5%)

Approved for use as borrow and blending sand, and locally suitable for use as winter sand.

Reserves are calculated only for the deposit area containing the pit. The two possible ice-contact deposits to the north have not been proven; they could contain significant additional reserves.

LOCATION:	H14-3	**NTS:**	21 H/14E
TYPE OF DEPOSIT:	Glaciofluvial outwash	**COUNTY:**	Westmorland
EXPOSURE TYPE:	Pit	**PARISH:**	Salisbury
STATUS:	Inactive	**UTM:**	263 921

SECTION DESCRIPTION & COMMENTS:

0.7 m Soil: Slightly silty; developed on the underlying material.

0.7 m Sandy Gravel: Poorly sorted very fine to very coarse gravel with medium to very coarse sand; exhibits crude horizontal stratification; clasts are subrounded to rounded; maximum clast size is 0.15 m.

0.4 m Slump Covered: Assumed to be material as above; the base of the pit is wet.

In the pit to the north, 1.0 m of dense reddish brown sandy till overlies 0.6+ m of gravelly fine to coarse sand. Silt and fine sand are locally present at the base. Analysis of a sample from this site was reported by Kingston (1974). The material had 85% passing 4.75 mm, 1.2% passing 75 μm, and a Los Angeles abrasion loss of 27.7%. In an abandoned, overgrown pit immediately to the west, the till is overlain by approximately 1 m of gravelly sand. The interfingering of the till and outwash materials is suggestive of a fluctuating ice margin.

Kingston (1974) estimated workable reserves in this deposit at 575 000 m^3. ADI Limited (1975) did not feel that the area could support a major aggregate extraction operation, due to the relatively thick overburden, shallow water table, and high land values. Consequently, the reserve estimate has been reduced to 200 000 m^3. Most of this potential material is located in the western part of the deposit.

MECHANICAL ANALYSIS:

sieve	50mm	25mm	19mm	9.5mm	4.75mm	2.36mm	1.18mm	600μm	300μm	150μm	75μm
% pass.	94.7	82.0	76.2	62.4	50.6	36.0	23.4	9.6	3.2	1.5	0.8

LITHOLOGIC ANALYSIS:

Unsound Lithotypes 21%	Sound Lithotypes 79%
sandstone 6; siltstone 6; felsic intrusive 5; shale 3; metasedimentary 1	felsic intrusive 23; metasedimentary 10; felsic extrusive 9; mafic extrusive 9; sandstone 8; quartzite 8; gneiss 6; mafic intrusive 3; greywacke 2; quartz 1

ESTIMATION OF RESERVES:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (metres)	Recoverable Reserves (m^3) Probable
60	20	1	200 000

LOCATION:	H14-4	**NTS:**	21 H/14E
TYPE OF DEPOSIT:	Glaciofluvial outwash	**COUNTY:**	Westmorland
EXPOSURE TYPE:	Pit	**PARISH:**	Salisbury
STATUS:	Abandoned	**UTM:**	373 954

SECTION DESCRIPTION & COMMENTS:

0.5 m Soil: Slightly silty; developed on the underlying material.

0.8 m Gravelly Sand: Gravelly medium to coarse sand; water is present at the base of the section.

Maximum section height in the pit area is 1.8 m. Sections in the portions of the deposit to the east of the Pollett River vary from 1.2 to 1.8 m. The material varies from gravelly sand through to a relatively fine sandy gravel. The deposit is relatively thin, and is underlain in different areas by silt, till, and sandstone. The water table is also very high throughout much of the area of the deposit. Consequently, workable reserves are considered to be limited.

The portion of the deposit at River Glade has been tested by DOT (1960). The results were as follows (for 12 samples):

Mechanical Analysis:
69.0 to 94.8% passing 4.75 mm (average 82.3%);
2.3 to 10.4% passing 75 μm (average 4.8%).

Los Angeles abrasion loss: 24.0 to 37.5%

(CONTINUED)

MECHANICAL ANALYSIS:

sieve		25mm	19mm	9.5mm	4.75mm	2.36mm	1.18mm	600μm	300μm	150μm	75μm
% pass.			100.0	98.2	89.4	80.6	69.3	41.0	9.7	1.5	0.5

LITHOLOGIC ANALYSIS: N.A.

Unsound Lithotypes	%	Sound Lithotypes	%

ESTIMATION OF RESERVES:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (metres)	Recoverable Reserves (m^3) Probable
			Limited

LOCATION #: H14-4 (cont'd)

Kingston (1974) also reported analyses on two samples from this area. The results are similar to those of DOT - 77% and 99% passing 4.75 mm; 5.6% and 6.7% passing 75 μm.

The material in this area is also subject to severe limitations on workable thicknesses. The DOT (1960) data indicate that the depth to clay or water (including overburden) varies from 0 to 2.7 m, with an average of 1.7 m. Most of the workable portions of the deposit appear to be depleted. Remaining reserves in this area are also considered to be limited.

LOCATION:	H14-5	NTS:	21 H/14E
TYPE OF DEPOSIT:	Glaciofluvial outwash	COUNTY:	Westmorland
EXPOSURE TYPE:	Pit	PARISH:	Salisbury
STATUS:	Active-on-demand (lightly)	UTM:	384 887

SECTION DESCRIPTION & COMMENTS:

0.6 m Soil: The upper 0.4 m is a silty sand; the lower 0.2 m is developed on the underlying material.

1.4 m Gravel: Horizontally stratified medium to very coarse gravel, with thin (less than 5 cm) interbeds of sandy very fine to medium gravel and openwork pea gravel; clasts are subrounded to rounded.

- Till: Dense, reddish brown clayey till.

This small deposit is nearing depletion. Limited reserves of similar material may be present in the small outwash deposit immediately to the north.

The high content of sound lithotypes in this deposit indicates that it was formed from meltwater flowing northward from the Central Plateau of the Caledonian Highlands.

MECHANICAL ANALYSIS:

sieve	50mm	25mm	19mm	9.5mm	4.75mm	2.36mm	1.18mm	600µm	300µm	150µm	75µm
% pass.	81.0	46.5	44.1	30.8	22.9	16.5	11.9	6.7	3.0	1.4	0.8

LITHOLOGIC ANALYSIS:

Unsound Lithotypes 33%	Sound Lithotypes 67%
sandstone 23; siltstone 4; mafic extrusive 3; felsic intrusive 2; schist 1	felsic intrusive 19; mafic extrusive 13; felsic extrusive 10; gneiss 10; metasedimentary 8; mafic intrusive 2; metavolcanic 2; quartzite 2; sandstone 1

ESTIMATION OF RESERVES:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (metres)	Recoverable Reserves (m^3) Probable
		1	Limited

LOCATION:	H14-6	**NTS:**	21 H/14E
TYPE OF DEPOSIT:	Ice-contact (kame)	**COUNTY:**	Albert
EXPOSURE TYPE:	Pit	**PARISH:**	Elgin
STATUS:	Inactive	**UTM:**	422 809

SECTION DESCRIPTION & COMMENTS:

0.6 m Soil: Silty; developed on the underlying material.

1.2 m Sandy Gravel: Cross-stratified, slightly silty very fine to very coarse gravel with predominantly coarse to very coarse sand, and a few cobbles; clasts are subrounded; maximum clast size is 0.4 m; the bedding appears to dip northward.

6.1 m Slump Covered: Assumed to be material as above.

Some of the material in the pit area is till-like in character. This site has been previously sampled by Hamilton and Carroll (1975). Their sample (analysis recorded below) was from a slightly finer portion of the deposit; a sandy fine to medium gravel.

MECHANICAL ANALYSIS:

sieve	50mm	25mm	19mm	9.5mm	4.75mm	2.36mm	1.18mm	600μm	300μm	150μm	75μm
% pass.	86.5	76.6	75.6	68.2	52.9	35.3	23.2	14.9	11.1	9.0	7.1
H & C		99.1	95.5	86.7	61.9	51.3	32.7	24.5	13.7	7.8	4.3

LITHOLOGIC ANALYSIS:

Unsound Lithotypes 42%	Sound Lithotypes 58%
felsic intrusive 18; sandstone 6; siltstone 6; metavolcanic 4; felsic extrusive 2; mafic extrusive 2; conglomerate 2; metasedimentary 2	felsic intrusive 38; felsic extrusive 8; metavolcanic 4; gneiss 4; mafic extrusive 2; siltstone 2

ESTIMATION OF RESERVES:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (metres)	Recoverable Reserves (m^3) Probable
10	5	4	200 000

LOCATION:	H14-7	NTS:	21 H/14E
TYPE OF DEPOSIT:	Glaciofluvial outwash(?)	COUNTY:	Kings
EXPOSURE TYPE:	Road cut	PARISH:	Cardwell
STATUS:	Undeveloped	UTM:	285 695

SECTION DESCRIPTION & COMMENTS:

0.5 m Soil: Slightly silty; developed on the underlying material.

1.5 m Sand: Cross-bedded sand; beds vary from slightly silty very fine to fine sand through to gravelly medium to coarse sand; minor sandy gravel layers (not sampled) are present in the upper part of the unit; clasts are subrounded; maximum clast size is 7 cm; the bedding appears to dip northward.

This tiny deposit may be a small delta. Similar small deposits, as yet unexposed, may be present elsewhere in the map area. This is a potential site for small volumes of fine aggregate, such as winter sand.

MECHANICAL ANALYSIS:

sieve		25mm	19mm	9.5mm	4.75mm	2.36mm	1.18mm	600µm	300µm	150µm	75µm
% pass.		97.4	97.4	95.5	92.6	87.4	80.5	58.4	27.3	7.4	1.7

LITHOLOGIC ANALYSIS: N.A.

Unsound Lithotypes	%	Sound Lithotypes	%

ESTIMATION OF RESERVES:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (metres)	Recoverable Reserves (m^3) Probable
			Limited

LOCATION:	H14-8	NTS:	21 H/14E
TYPE OF DEPOSIT:	Glaciofluvial outwash (delta)	COUNTY:	Albert
EXPOSURE TYPE:	Pit	PARISH:	Elgin
STATUS:	Active-on-demand (lightly)	UTM:	369 735

SECTION DESCRIPTION & COMMENTS:

0.5 m Soil: Slightly silty; developed on sandy gravel topset beds.

0.4 m Sandy Gravel: Cross-bedded fine to medium gravel and medium to coarse sand.

0.9 m Sand: Cross-bedded fine to medium sand, with a few pebbles.

1.1 m Sandy Gravel: Cross-bedded very fine to coarse gravel and medium to very coarse sand.

1.0 m Slump Covered: Assumed to be sand or gravel.

All three of the above subsoil units are foreset beds, dipping northeastward. Sample A was obtained from the upper two units; Sample B from the lower unit. The overall composition of the exposed material should be approximated by the average of the two samples.

Clasts are subrounded to rounded. Maximum clast size in the pit area is 0.2 m.

This area of the deposit has also been tested by DOT (1958). Their results are as follows:

(CONTINUED)

MECHANICAL ANALYSIS:

sieve		25mm	19mm	9.5mm	4.75mm	2.36mm	1.18mm	600μm	300μm	150μm	75μm
% pass.	A	100.0	96.3	87.2	81.0	76.0	72.5	61.3	28.7	3.4	0.4
	B	86.1	82.2	72.4	57.9	41.0	27.9	12.1	3.0	1.2	0.8

LITHOLOGIC ANALYSIS:

Unsound Lithotypes 37%	Sound Lithotypes 63%
sandstone 19; felsic intrusive 4; mafic extrusive 4; schist 4; conglomerate 2; shale 2; siltstone 1; weathered 1	felsic intrusive 30; metasedimentary 8; felsic extrusive 7; mafic extrusive 7; gneiss 4; sandstone 3; metavolcanic 2; siltstone 1; greywacke 1

ESTIMATION OF RESERVES:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (metres)	Recoverable Reserves (m^3) Probable
	14 6	1 3	320 000

LOCATION #: H14-8 (cont'd)

Mechanical Analysis: fine aggregate (4 samples)
68.0 to 92.6% passing 4.75 mm (average 79.7%)
0.8 to 2.2% passing 75 μm (average 1.4%)

coarse aggregate (5 samples)
18.0 to 30.8% passing 4.75 mm (average 24.6%)
0.4 to 0.6% passing 75 μm (average 0.5%)

Los Angeles abrasion loss: 21.0 to 30.9%

The northern part of the section of the deposit to the west of the Pollett River has also been tested by DOT (1958, 1961, 1973), with the following results obtained (from 19 samples):

Mechanical Analysis:
20.0 to 68.3% passing 4.75 mm (average 38.0%)
0.1 to 3.9% passing 75 μm (average 1.4%)

Los Angeles abrasion loss: 18.0 to 27.5%

Recommended for use as borrow, subbase, and base-course aggregate

A sample obtained from this portion of the deposit by Hamilton and Carroll (1975) was similar in character.

The material in the northern part of the deposit, to the east of the Pollett River, appears to be similar to that sampled by DOT (above). In contrast, the material in the two abandoned pits in the southern part of the deposit, within the Village of Elgin, is sandy, similar to that at site H14-8. Pit faces in the latter area vary from approximately 2 to 7 m.

Kingston (1974) estimated reserves in the Elgin area as not in excess of 750 000 m^3. ADI Limited (1975) reported that the good-quality material was on land that was not available for extraction. The current reserve estimate is less than that of Kingston (1974), due to depletion and further sterilization by residential development. The largest area of material appears to be in the northern portion of the deposit. However, reserves are not large due to the thinness of the material in this area. The rest of the reserves are scattered among several small areas in the southern parts of the deposit.

LOCATION:	H14-9	NTS:	21 H/14E
TYPE OF DEPOSIT:	Glaciofluvial outwash	COUNTY:	Albert
EXPOSURE TYPE:	Pit	PARISH:	Elgin
STATUS:	Inactive	UTM:	386 690

SECTION DESCRIPTION & COMMENTS:

Pit (Sample A)

0.5 m Soil: Slightly silty; developed on the underlying material.

1.1 m Sand: Clean, gravelly fine to coarse sand, with no evident stratification; maximum clast size is 0.1 m.

4.0 m Slump Covered: Assumed to be material as above; an exposure at the base of the section consists of similar material, with minor silty bands.

A sample (Sample B) was also obtained from a road cut approximately 350 m north-northeast of the pit (UTM 383 693). The section at this site is as follows:

1.5 m Slump Covered: Assumed to be approximately 0.5 m of soil overlying material similar to that below.

0.5 m Cobbly Gravel: Poorly sorted, cobbly fine to very coarse gravel, with a few boulders; maximum clast size is 0.3 m.

0.9 m Slump Covered: Assumed to be material as above.

(CONTINUED)

MECHANICAL ANALYSIS:

sieve	50mm	25mm	19mm	9.5mm	4.75mm	2.36mm	1.18mm	600µm	300µm	150µm	75µm
% A pass.				100.0	97.0	91.3	84.3	65.8	22.4	0.9	0.0
B	89.1	63.8	55.4	39.9	29.0	21.3	15.8	10.6	6.5	4.0	2.6

LITHOLOGIC ANALYSIS:

Unsound Lithotypes 8%	Sound Lithotypes 92%
sandstone 3; felsic intrusive 1; felsic extrusive 1; mafic extrusive 1; metasedimentary 1; schist 1	felsic intrusive 25; felsic extrusive 14; gneiss 13; mafic extrusive 12; metasedimentary 11; mafic intrusive 6; metavolcanic 6; sandstone 3; quartzite 1; quartz 1

ESTIMATION OF RESERVES:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (metres)	Recoverable Reserves (m^3) Probable
			Limited

LOCATION #: H14-9 (cont'd)

As indicated by the above section descriptions, the material in this deposit is highly variable. Bedrock is exposed at the surface near the road intersection. Reserves are limited by the presence of the roads, houses, and cemetery.

LOCATION:	H14-10	**NTS:**	21 H/14E
TYPE OF DEPOSIT:	Ice-contact (esker)	**COUNTY:**	Albert
EXPOSURE TYPE:	Pit	**PARISH:**	Elgin
STATUS:	Active-on-demand	**UTM:**	419 628

SECTION DESCRIPTION & COMMENTS:

0.6 m Soil: Slightly silty; developed on the underlying material.

0.9 m Sandy Gravel: Fine to coarse gravel with medium to coarse sand; contains a few cobbles.

1.6 m Sand: Gravelly medium to coarse sand (0.3 m), overlying medium sand grading downward into very fine to fine sand with silty bands.

1.5 m Gravel: Cobbly medium to very coarse gravel with a matrix of medium to coarse sand (0.3 m), overlying openwork very fine to medium gravel interbedded with openwork medium to very coarse gravel and minor thin beds of coarse to very coarse sand.

1.0 m Sand: Well-sorted medium to coarse sand; Sample A was obtained from this unit.

2.2 m Sandy Gravel: Horizontally stratified sandy gravel; the sand component is predominantly medium to very coarse; the gravel units vary from very fine to medium, to cobbly coarse to very coarse gravel; some of the beds are openwork; Sample B was obtained from this unit.

0.8 m Silty Sand: Interbedded sandy silt and very fine to fine sand; an 0.2 m thick bed of medium to coarse sand is present near the base.

(CONTINUED)

MECHANICAL ANALYSIS:

sieve	50mm	25mm	19mm	9.5mm	4.75mm	2.36mm	1.18mm	600µm	300µm	150µm	75µm
% A pass.				100.0	99.7	98.3	94.2	60.3	14.9	2.8	1.3
B	66.2	55.5	51.1	40.7	31.2	22.7	15.2	8.1	5.6	4.5	3.6

LITHOLOGIC ANALYSIS:

Unsound Lithotypes 27%

siltstone 8; sandstone 7; mafic extrusive 5; felsic intrusive 2; shale 2; metavolcanic 1; metasedimentary 1; weathered 1

Sound Lithotypes 73%

felsic intrusive 15; gneiss 15; felsic extrusive 13; mafic extrusive 6; metasedimentary 6; greywacke 5; metavolcanic 5; sandstone 3; quartz 3; mafic intrusive 2

ESTIMATION OF RESERVES:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (metres)	Recoverable Reserves (m^3) Probable
			Limited

LOCATION #: H14-10 (cont'd)

Most of the pit area is abandoned, the deposit being largely depleted. The recently active section (above) is at the western end of the pit. Maximum clast size in the pit area is 1.6 m. Most of the clasts are subrounded.

The pit area was sampled by DOT in 1973. The results of their tests (on five samples) are as follows:

Mechanical Analysis:
21 to 62% passing 4.75 mm (average 42%)
1.7 to 3.5% passing 75 μm (average 2.4%)

Los Angeles abrasion loss: 31.3% to 32.3%

Recommended for borrow usage only, in the pit-run state, due to the excess fines content; could be upgraded for subbase and base-course usage.

Limited reserves are present in each of the segments of this esker.

LOCATION:	H14-11	**NTS:**	21 H/14E
TYPE OF DEPOSIT:	Ice-contact (esker)	**COUNTY:**	Albert
EXPOSURE TYPE:	Pit	**PARISH:**	Elgin
STATUS:	Active-on-demand (lightly)	**UTM:**	441 721

SECTION DESCRIPTION & COMMENTS:

0.7 m Soil: Silty; indurated; developed on the underlying material.

1.2 m Sandy Gravel: Highly variable, very poorly sorted sandy gravel; the gravel is very fine to very coarse and cobbly, with a few boulders; the sand matrix varies from silty very fine to fine sand, to fine to coarse sand; some of the silty parts are till-like in texture; clasts are subrounded to rounded; maximum clast size is 0.8 m.

1.9 m Slump Covered: Assumed to be material similar to that above; locally, the material at the base of the pit appears to be of better quality than that described.

Limited reserves remain in this esker segment. Limited reserves are also present in the undeveloped segment to the west.

MECHANICAL ANALYSIS:

sieve	50mm	25mm	19mm	9.5mm	4.75mm	2.36mm	1.18mm	600μm	300μm	150μm	75μm
% pass.	83.5	66.3	63.2	51.0	39.8	27.2	19.7	13.6	9.7	6.3	5.3

LITHOLOGIC ANALYSIS:

Unsound Lithotypes 27%

sandstone 13; felsic intrusive 6; mafic extrusive 2; shale 2; metasedimentary 2; conglomerate 1; schist 1

Sound Lithotypes 73%

felsic intrusive 24; felsic extrusive 12; metavolcanic 11; gneiss 9; mafic extrusive 6; metasedimentary 6; sandstone 4; quartzite 1

ESTIMATION OF RESERVES:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (metres)	Recoverable Reserves (m^3) Probable
			Limited

APPENDIX B

SITE DESCRIPTIONS OF

PETITCODIAC MAP AREA (WEST HALF)

21 H/14W

LOCATION: H14-50 **NTS:** 21 H/14W

TYPE OF DEPOSIT: Glaciofluvial outwash (delta) **COUNTY:** Kings

EXPOSURE TYPE: Pit **PARISH:** Havelock

STATUS: Inactive **UTM:** 148 834

SECTION DESCRIPTION & COMMENTS:

0.6 m Soil: Sandy to gravelly.

1.2 m Till: Lightly compacted, gravelly till.

1.2 m Gravelly Sand: Gravelly coarse sand with subrounded clasts.

Pit faces averaging about 3 m in height expose gravelly sand to sandy gravel (approximately 30% gravel overall). Maximum observed clast size is 0.2 m. A substantial depth of material may exist beneath the present pit floor, but the presence of free water at the base of the pit indicates that the water table has limited the depth of excavation.

A pit containing similar material is present to the west of the road.

MECHANICAL ANALYSIS:

sieve		25mm	19mm	9.5mm	4.75mm	2.36mm	1.4mm	600µm	300µm	150µm	75µm
% pass.		97.8	96.3	81.7	65.4	52.3	42.5	26.2	8.5	3.3	2.0

LITHOLOGIC ANALYSIS:

Unsound Lithotypes 12%	Sound Lithotypes 88%
weathered 6; schist 5; mudstone 1	felsic extrusive 57; felsic intrusive 19; mafic extrusive 9; quartzite 3

ESTIMATION OF RESERVES:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (metres)	Recoverable Reserves (m^3) Probable
	140	1.8	2.5 million

LOCATION:	H14-51	NTS:	21 H/14W
TYPE OF DEPOSIT:	Glaciofluvial outwash (delta)	COUNTY:	Kings
EXPOSURE TYPE:	Pit	PARISH:	Havelock
STATUS:	Active-on-demand	UTM:	141 823

SECTION DESCRIPTION & COMMENTS:

0.5 m Soil

0.9 m Gravel: Slightly silty, cobbly medium to very coarse gravel; clasts are subrounded to rounded; this unit is possibly a deltaic topset deposit.

1.2 m Till: Moderately compact gravelly till, derived from, and gradational into, the underlying unit; may be laterally discontinuous.

0.8 m Sandy Gravel: Clean, sandy fine gravel; clasts are subangular to subrounded.

Sample A is a composite sample obtained from all three of the above sub-soil units. Sample B was obtained from a 2.4 m section of clean sandy fine gravel, with subangular to subrounded clasts. Maximum clast size is 0.3 m.

A river cut to the south of the pit exposes the following section:

1.1 m Till: Gravelly till.
4.6 m Sandy Gravel: Indistinctly stratified sandy fine gravel.

CONTINUED

MECHANICAL ANALYSIS:

sieve		25mm	19mm	9.5mm	4.75mm	2.36mm	1.4mm	600µm	300µm	150µm	75µm
% pass. A		85.8	83.6	71.9	60.4	49.9	40.3	23.2	9.7	4.0	2.2
B		97.8	97.1	83.6	69.5	54.9	44.0	25.0	7.6	2.1	1.4

LITHOLOGIC ANALYSIS:

Unsound Lithotypes 27%
sandstone 13; schist 6; gneiss 4; weathered 4

Sound Lithotypes 73%
felsic extrusive 34; felsic intrusive 11; mafic extrusive 11; mafic intrusive 6; quartz 6; quartzite 5

ESTIMATION OF RESERVES:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (metres)	Recoverable Reserves (m^3) Probable
	26	3.6	940 000

LOCATION #: H14-51 (cont'd)

1.8 m Slump Covered: Probably sandy gravel.
0.3 m Sandy Gravel: As above.
1.1 m Silty Clay: Grey silty clay with a few silt interbeds.
0.6 m Silty Sand: Silty fine to medium sand.
0.5 m Sandy Gravel: Fine gravel and coarse sand.
0.3 m Slump Covered: To river level.

Most of the estimated reserves lie to the west of Highway 890. Due to the presence of the till cap, the areal extent of the deposit in this area is difficult to define.

LOCATION:	H14-52	NTS:	21 H/14W
TYPE OF DEPOSIT:	Ice-contact	COUNTY:	Kings
EXPOSURE TYPE:	Basement excavation	PARISH:	Studholm
STATUS:	Undeveloped	UTM:	099 781

SECTION DESCRIPTION & COMMENTS:

0.7 m Soil: Till-like in places.

2.1 m Sandy Gravel: Sandy fine to medium gravel; clasts are subrounded to rounded; maximum clast size is 0.15 m. The bedding dips approximately northward.

Reserves in this deposit are limited, and exploitation may be undesirable due to residential development.

MECHANICAL ANALYSIS:

sieve		25mm	19mm	9.5mm	4.75mm	2.36mm	1.4mm	600μm	300μm	150μm	75μm
% pass.		79.4	76.7	60.2	48.6	36.9	27.2	14.6	7.3	3.4	1.9

LITHOLOGIC ANALYSIS:

Unsound Lithotypes 30%	Sound Lithotypes 70%
sandstone 17; weathered 8; schist 5	mafic extrusive 40; felsic extrusive 11; quartz 11; quartzite 5; felsic intrusive 2; mafic intrusive 1

ESTIMATION OF RESERVES:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (metres)	Recoverable Reserves (m^3) Probable
			Limited

LOCATION:	H14-53	NTS:	21 H/14W
TYPE OF DEPOSIT:	Ice-contact	COUNTY:	Kings
EXPOSURE TYPE:	Pit	PARISH:	Studholm
STATUS:	Active-on-demand	UTM:	097 780

SECTION DESCRIPTION & COMMENTS:

0.6 m Soil: Gravelly.

4.9 m Sandy Gravel: Primarily sandy medium gravel, with localized concentrations of cobbles and small boulders; maximum clast size is approximately 0.3 m; some clasts exhibit silt and clay coatings.

Stratification, often contorted, is evident in some areas of the pit. Elsewhere the material is massive. Some thin silt and till-like units were observed, particularly in the upper part of the section. All of the above characteristics indicate deposition in close proximity to glacial ice.

The fines content is probably high in some parts of the deposit.

MECHANICAL ANALYSIS:

sieve		25mm	19mm	9.5mm	4.75mm	2.36mm	1.4mm	600µm	300µm	150µm	75µm
% pass.		92.2	89.2	72.0	53.2	37.8	28.7	16.0	8.0	3.7	1.6

LITHOLOGIC ANALYSIS:

Unsound Lithotypes 37%	Sound Lithotypes 63%
sandstone 15; schist 10; weathered 8; mudstone 4	felsic extrusive 20; quartz 16; mafic extrusive 15; quartzite 8; mafic intrusive 4

ESTIMATION OF RESERVES:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (metres)	Recoverable Reserves (m^3) Probable
	1.4	3.6	50 000

LOCATION:	H14-54	NTS:	21 H/14W
TYPE OF DEPOSIT:	Ice-contact	COUNTY:	Kings
EXPOSURE TYPE:	Pit	PARISH:	Studholm
STATUS:	Inactive	UTM:	104 788

SECTION DESCRIPTION & COMMENTS:

0.6 m Soil

13.1 m Sandy Gravel: Massive to poorly stratified, sandy cobbly medium to very coarse gravel; a coarser unit of cobble gravel with small boulders up to 0.3 m in size is present in the middle of the section; clasts are subrounded to well rounded; some clasts exhibit clay coatings.

Many of the large clasts in this deposit consist of soft, very friable red mudstone or sandstone.

Reserve estimates are presented for both the ice-contact deposit and the adjacent (to the east) delta segment.

MECHANICAL ANALYSIS:

sieve		25mm	19mm	9.5mm	4.75mm	2.36mm	1.4mm	600µm	300µm	150µm	75µm
% pass.		78.4	75.3	66.1	55.1	40.2	24.8	6.6	2.2	1.0	0.6

LITHOLOGIC ANALYSIS:

Unsound Lithotypes 41%	Sound Lithotypes 59%
sandstone 24; weathered 9; mudstone 5; shale 3	felsic intrusive 14; felsic extrusive 11; mafic extrusive 9; quartzite 9; quartz 9; mafic intrusive 7

ESTIMATION OF RESERVES:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (metres)	Recoverable Reserves (m^3) Probable
ice-contact deposit	4.8	2.7	130 000
deltaic deposit	5.7	2.7	150 000

LOCATION:	H14-55	NTS:	21 H/14W
TYPE OF DEPOSIT:	Glaciofluvial outwash (delta)	COUNTY:	Kings
EXPOSURE TYPE:	Pit	PARISH:	Studholm
STATUS:	Abandoned	UTM:	114 790

SECTION DESCRIPTION & COMMENTS:

0.6 m Soil

1.5 m Sandy Gravel: Relatively clean and well-sorted sandy medium gravel; clasts are subangular to subrounded; maximum clast size is approximately 0.1 m.

2.4 m Slump Covered: Assumed to be material as above.

Reserve estimates include a large area to the west of Highway 890.

MECHANICAL ANALYSIS:

sieve		25mm	19mm	9.5mm	4.75mm	2.36mm	1.4mm	600µm	300µm	150µm	75µm
% pass.		79.2	70.6	55.4	43.4	35.6	28.6	12.6	2.7	0.6	0.3

LITHOLOGIC ANALYSIS:

Unsound Lithotypes 67%	Sound Lithotypes 33%
mudstone 28; sandstone 20; schist and shale 16; gneiss 1; chert 1; weathered 1	felsic extrusive 18; mafic extrusive 6; quartzite and quartz 5; felsic intrusive 4

ESTIMATION OF RESERVES:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (metres)	Recoverable Reserves (m^3) Probable
	40	2.7	1.1 million

LOCATION:	H14-56	NTS:	21 H/14W
TYPE OF DEPOSIT:	Glaciofluvial outwash (delta)	COUNTY:	Kings
EXPOSURE TYPE:	Pit	PARISH:	Havelock
STATUS:	Abandoned	UTM:	118 798

SECTION DESCRIPTION & COMMENTS:

The upper 1.8 m of a slumped and partly overgrown face approximately 5 m high exposes cobbly medium to very coarse gravel. Maximum clast size is 0.3 m. The quality of the material is limited by its very high content of friable clasts. Minor clay coatings are present on some clasts. Soil thickness is 0.6 m.

MECHANICAL ANALYSIS:

sieve		25mm	19mm	9.5mm	4.75mm	2.36mm	1.4mm	600µm	300µm	150µm	75µm
% pass.		73.4	66.1	46.4	32.7	25.8	20.9	12.1	6.5	2.9	1.0

LITHOLOGIC ANALYSIS:

Unsound Lithotypes 78%	Sound Lithotypes 22%
mudstone 70; sandstone 7; weathered 1	mafic extrusive 8; felsic extrusive 5; mafic intrusive 4; felsic intrusive 3; quartzite 2

ESTIMATION OF RESERVES:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (metres)	Recoverable Reserves (m^3) Probable
	2.8	2.7	75 000

LOCATION:	H14-57	**NTS:**	21 H/14W
TYPE OF DEPOSIT:	Glaciofluvial outwash (delta)	**COUNTY:**	Kings
EXPOSURE TYPE:	Pit	**PARISH:**	Havelock
STATUS:	Inactive	**UTM:**	122 803

SECTION DESCRIPTION & COMMENTS:

0.9 m Till: Compact gravelly till.

6.1 m Gravel: Fine gravel near the surface grading downward into cobble gravel; maximum clast size is 0.4 m; clay coatings are present on some clasts.

The pit face is largely slump covered due to inactivity. Material has been crushed at this site in the past.

Approximately half of the workable reserves lie to the west of Highway 890, southwest of the pit area.

MECHANICAL ANALYSIS:

sieve		25mm	19mm	9.5mm	4.75mm	2.36mm	1.4mm	600µm	300µm	150µm	75µm
% pass.		65.1	54.6	40.7	31.9	24.2	16.0	5.4	2.9	1.9	1.3

LITHOLOGIC ANALYSIS:

Unsound Lithotypes 65%	Sound Lithotypes 35%
mudstone 52; sandstone 7; chert 3; weathered 2; schist 1	felsic extrusive 12; mafic intrusive 10; felsic intrusive 7; mafic extrusive 4; quartzite 2

ESTIMATION OF RESERVES:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (metres)	Recoverable Reserves (m^3) Probable
	3.6	3.6	130 000

LOCATION:	H14-58	NTS:	21 H/14W
TYPE OF DEPOSIT:	Glaciofluvial outwash (delta)	COUNTY:	Kings
EXPOSURE TYPE:	Pit	PARISH:	Havelock
STATUS:	Abandoned	UTM:	167 855

SECTION DESCRIPTION & COMMENTS:

A 1.2 m section in a heavily overgrown 1.8 m face exposes dirty sandy fine to medium gravel, possibly a gravelly till derived from underlying gravel. Maximum clast size is 0.1 m. Clay coatings on clasts, and a general excess of fines, were noted in the deposit.

MECHANICAL ANALYSIS:

sieve	25mm	19mm	9.5mm	4.75mm	2.36mm	1.4mm	600µm	300µm	150µm	75µm
% pass.	98.4	94.6	80.2	66.5	53.2	42.6	27.3	14.0	7.3	4.0

LITHOLOGIC ANALYSIS:

Unsound Lithotypes 14%	Sound Lithotypes 86%
weathered 10; sandstone 3; schist 1	felsic extrusive 34; mafic extrusive 19; felsic intrusive 18; mafic intrusive 11; quartzite 4

ESTIMATION OF RESERVES:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (metres)	Recoverable Reserves (m^3) Probable
	130	1.4	1.8 million

LOCATION:	H14-59	NTS:	21 H/14W
TYPE OF DEPOSIT:	Glaciofluvial outwash (delta)	COUNTY:	Kings
EXPOSURE TYPE:	Pit	PARISH:	Havelock
STATUS:	Inactive	UTM:	168 850

SECTION DESCRIPTION & COMMENTS:

0.6 m Soil: Developed in a gravelly till.

2.4 m Sandy Gravel: Clean, sandy fine to medium gravel; clasts are subangular to subrounded; maximum clast size is 0.1 m.

MECHANICAL ANALYSIS:

sieve		25mm	19mm	9.5mm	4.75mm	2.36mm	1.4mm	600μm	300μm	150μm	75μm
% pass.		89.4	83.9	67.0	54.3	44.0	35.3	20.1	5.4	1.1	0.5

LITHOLOGIC ANALYSIS:

Unsound Lithotypes 26%
weathered 14; sandstone 10; schist 2

Sound Lithotypes 74%
felsic extrusive 40; felsic intrusive 15; mafic extrusive 11; mafic intrusive 6; quartzite 2

ESTIMATION OF RESERVES:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (metres)	Recoverable Reserves (m^3) Probable
	3.4	2.3	75 000

LOCATION:	H14-60	NTS:	21 H/14W
TYPE OF DEPOSIT:	Glaciofluvial outwash (delta)	COUNTY:	Kings
EXPOSURE TYPE:	River cut	PARISH:	Studholm
STATUS:	Undeveloped	UTM:	096 760

SECTION DESCRIPTION & COMMENTS:

2.4 m Overgrown

2.4 m Gravel: Generally medium gravel grading downward into generally fine gravel.

6.7 m Sand: Gravelly medium to coarse sand, grading downward into fine to medium sand with silty interbeds.

The extent of this deposit is uncertain. Consequently, reserve estimates may be conservative.

MECHANICAL ANALYSIS: N.A.

sieve		25mm	19mm	9.5mm	4.75mm	2.36mm	1.4mm	600µm	300µm	150µm	75µm
% pass.											

LITHOLOGIC ANALYSIS: N.A.

Unsound Lithotypes	%	Sound Lithotypes	%

ESTIMATION OF RESERVES:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (metres)	Recoverable Reserves (m^3) Probable
	20	1.8	360 000

LOCATION:	H14-61	**NTS:**	21 H/14W
TYPE OF DEPOSIT:	Ice-contact	**COUNTY:**	Kings
EXPOSURE TYPE:	Pit	**PARISH:**	Havelock
STATUS:	Active-on-demand	**UTM:**	170 856

SECTION DESCRIPTION & COMMENTS:

0.6 m Till

0.9 m Gravel: Generally fine to medium gravel.

0.9 m Till: Loose, poorly compacted, stony silty sand till.

0.6 m Sandy Gravel: Predominantly fine gravel and coarse sand.

The material exposed in this pit is very dirty. Many of the clasts are clay coated. The material is only suitable for use as fill. Maximum clast size is 0.3 m.

MECHANICAL ANALYSIS:

sieve		25mm	19mm	9.5mm	4.75mm	2.36mm	1.4mm	600µm	300µm	150µm	75µm
% pass.		99.6	97.7	87.2	74.5	60.0	47.8	28.2	13.5	7.0	4.5

LITHOLOGIC ANALYSIS:

Unsound Lithotypes 30%	Sound Lithotypes 70%
sandstone 16; weathered 14	felsic extrusive 38; felsic intrusive 16; mafic extrusive 9; mafic intrusive 5; quartz 2

ESTIMATION OF RESERVES:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (metres)	Recoverable Reserves (m^3) Probable
	14	2.7	380 000

LOCATION:	H14-62	NTS:	21 H/14W
TYPE OF DEPOSIT:	Ice-contact (esker)	COUNTY:	Kings
EXPOSURE TYPE:	Pit	PARISH:	Havelock
STATUS:	Inactive	UTM:	172 867

SECTION DESCRIPTION & COMMENTS:

0.6 m Till

0.6 m Sandy Gravel: Sandy fine gravel.

0.9 m Till

0.9 m Sandy Gravel: Sandy, generally medium gravel; clasts are subangular to subrounded; the sample was obtained from this unit.

0.6 m Slump Covered

This deposit has the form of a long, rounded ridge; evidently an esker that has been glacially overridden. Maximum clast size is 0.1 m. Inclusion of the till units will significantly increase the fine particle content of the aggregate.

MECHANICAL ANALYSIS:

sieve		25mm	19mm	9.5mm	4.75mm	2.36mm	1.4mm	600µm	300µm	150µm	75µm
% pass.		80.8	75.6	66.0	56.8	46.0	38.6	23.9	11.9	4.5	2.8

LITHOLOGIC ANALYSIS:

Unsound Lithotypes 22%	Sound Lithotypes 78%
sandstone 10; weathered 5; mudstone 4; schist 3	felsic intrusive 33; felsic extrusive 21; mafic extrusive 8; mafic intrusive 8; quartzite 4; hornfels 4

ESTIMATION OF RESERVES:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (metres)	Recoverable Reserves (m^3) Probable
	4.5	1.8	80 000

LOCATION:	H14-63	NTS:	21 H/14W
TYPE OF DEPOSIT:	Glaciofluvial outwash (delta)	COUNTY:	Kings
EXPOSURE TYPE:	Pit	PARISH:	Havelock
STATUS:	Abandoned	UTM:	135 813

SECTION DESCRIPTION & COMMENTS:

1.8 m Slump Covered: Vegetation covered.

0.8 m Sandy Gravel: Sandy, predominantly fine gravel; maximum observed clast size is 3 cm.

The total terrace height in this vicinity is about 7.5 m, indicating a potential for additional workable reserves beneath the pit floor. Nearby exposures indicate that 0.6 to 1.2 m of till overlies the sandy gravel.

Due to the presence of the till cap, detailed testing would be required to determine the true extent of the deposit.

MECHANICAL ANALYSIS:

sieve		25mm	19mm	9.5mm	4.75mm	2.36mm	1.4mm	600µm	300µm	150µm	75µm
% pass.		99.5	97.7	83.3	67.7	50.1	37.2	19.6	7.5	2.7	1.4

LITHOLOGIC ANALYSIS:

Unsound Lithotypes 33%	Sound Lithotypes 67%
weathered 15; sandstone 13; schist 5	felsic extrusive 34; felsic intrusive 13; mafic extrusive 9; quartzite 4; quartz 4; mafic intrusive 3

ESTIMATION OF RESERVES:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (metres)	Recoverable Reserves (m^3) Probable
	3	2.7	80 000

LOCATION:	H14-64	NTS:	21 H/14W
TYPE OF DEPOSIT:	Glaciofluvial outwash (delta)	COUNTY:	Kings
EXPOSURE TYPE:	River cut	PARISH:	Havelock
STATUS:	Undeveloped	UTM:	139 814

SECTION DESCRIPTION & COMMENTS:

0.6 m Soil

1.8 m Sandy Gravel: Predominantly fine to medium gravel and medium to coarse sand; minor silty sand interbeds are present in the upper 0.9 m of the unit; clasts are subangular to subrounded; maximum clast size is 6 cm.

2.7 m Till: Red, stony clayey silt till.

The area of this deposit has not been accurately delimited.

MECHANICAL ANALYSIS:

sieve		25mm	19mm	9.5mm	4.75mm	2.36mm	1.4mm	600μm	300μm	150μm	75μm
% pass.		86.6	81.0	64.2	53.5	42.3	33.2	16.1	4.3	1.1	0.5

LITHOLOGIC ANALYSIS:

Unsound Lithotypes 36%	Sound Lithotypes 64%
sandstone 15; schist 9; siltstone 7; weathered 5	felsic extrusive 22; felsic intrusive 21; mafic extrusive 13; mafic intrusive 5; quartzite 3

ESTIMATION OF RESERVES:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (metres)	Recoverable Reserves (m^3) Probable
			Limited

LOCATION:	H14-65	**NTS:**	21 H/14W
TYPE OF DEPOSIT:	Ice-contact	**COUNTY:**	Kings
EXPOSURE TYPE:	Pit	**PARISH:**	Studholm
STATUS:	Inactive	**UTM:**	081 748

SECTION DESCRIPTION & COMMENTS:

0.5 m Soil

1.0 m Sandy Gravel: Sandy fine to medium gravel grading downward into gravelly coarse sand.

0.5 m Sand: Medium sand with minor coarse sand interbeds.

0.8 m Slump Covered

The sample is a composite from the above section. Maximum clast size is 6 cm.

The material in the ice-contact deposit along Smiths Creek, approximately 1 km to the east, is visually similar in composition. This deposit is probably an esker remnant.

MECHANICAL ANALYSIS:

sieve		25mm	19mm	9.5mm	4.75mm	2.36mm	1.4mm	600μm	300μm	150μm	75μm
% pass.		93.5	88.9	78.8	68.0	55.8	44.9	25.2	8.2	1.4	0.7

LITHOLOGIC ANALYSIS:

Unsound Lithotypes 29%	Sound Lithotypes 71%
sandstone 14; weathered 9; schist 6	felsic extrusive 24; mafic extrusive 20; felsic intrusive 10; quartzite 10; mafic intrusive 7

ESTIMATION OF RESERVES:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (metres)	Recoverable Reserves (m^3) Probable
H14-65	6.5	1.8	120 000
deposit to east	11	1.8	200 000

LOCATION:	H14-66	NTS:	21 H/14W
TYPE OF DEPOSIT:	Glaciofluvial outwash	COUNTY:	Kings
EXPOSURE TYPE:	Pit	PARISH:	Havelock
STATUS:	Abandoned	UTM:	189 958

SECTION DESCRIPTION & COMMENTS:

0.5 m Soil

1.3 m Sandy Gravel: Sandy fine to medium gravel; maximum clast size is 0.1 m.

This small deposit lies in the bottom of a gentle valley, and is terraced by a small stream. Due to its high sandstone content, the material is probably suitable only for use as fill.

MECHANICAL ANALYSIS:

sieve		25mm	19mm	9.5mm	4.75mm	2.36mm	1.4mm	600µm	300µm	150µm	75µm
% pass.		90.7	87.9	81.9	73.6	66.2	56.7	31.7	11.0	3.7	1.5

LITHOLOGIC ANALYSIS:

Unsound Lithotypes 39%	Sound Lithotypes 61%
sandstone 32; weathered 7	felsic intrusive 35; mafic intrusive 12; quartzite 12; felsic extrusive 2

ESTIMATION OF RESERVES:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (metres)	Recoverable Reserves (m^3) Probable
			Limited

LOCATION:	H14-67	NTS:	21 H/14W
TYPE OF DEPOSIT:	Ice-contact	COUNTY:	Kings
EXPOSURE TYPE:	Pit	PARISH:	Studholm
STATUS:	Inactive	UTM:	069 734

SECTION DESCRIPTION & COMMENTS:

0.5 m Soil

5.6 m Gravelly Sand: Gravelly medium sand with a number of silt or sandy silt interbeds (approximately 5 cm thick); a few beds of gravelly coarse sand are present in the lower 1.5 m of the unit.

A number of conglomerate boulders (up to 1 m in size) are present on the pit floor. None are evident in the pit face.

MECHANICAL ANALYSIS:

sieve		25mm	19mm	9.5mm	4.75mm	2.36mm	1.4mm	600µm	300µm	150µm	75µm
% pass.		98.4	98.1	96.1	91.6	80.6	71.5	52.2	29.3	11.9	6.4

LITHOLOGIC ANALYSIS: N.A.

Unsound Lithotypes	%	Sound Lithotypes	%

ESTIMATION OF RESERVES:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (metres)	Recoverable Reserves (m^3) Probable
	10	2.7	270 000

LOCATION:	H14-68	NTS:	21 H/14W
TYPE OF DEPOSIT:	Ice-contact (kame moraine)	COUNTY:	Kings
EXPOSURE TYPE:	Pit	PARISH:	Studholm
STATUS:	Inactive	UTM:	064 724

SECTION DESCRIPTION & COMMENTS:

0.9 m Till: Sandy till.

1.8 m Silty Sand: Well-bedded, silty very fine to medium sand.

0.9 m Sandy Gravel: Clean, sandy fine to medium gravel.

3.0 m Slump Covered

Maximum clast size is 0.25 m. The fines content is high in some parts of the deposit.

MECHANICAL ANALYSIS:

sieve		25mm	19mm	9.5mm	4.75mm	2.36mm	1.4mm	600μm	300μm	150μm	75μm
% pass.		92.7	88.1	75.9	67.0	59.6	54.3	43.6	31.5	20.8	12.1

LITHOLOGIC ANALYSIS:

Unsound Lithotypes 37%	Sound Lithotypes 63%
sandstone 26; weathered 8; gneiss 3	quartz 16; felsic extrusive 15; felsic intrusive 13; mafic extrusive 11; mafic intrusive 4; quartzite 4

ESTIMATION OF RESERVES:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (metres)	Recoverable Reserves (m^3) Probable
	11 5	3.7 1.8	500 000

LOCATION: H14-69 NTS: 21 H/14W

TYPE OF DEPOSIT: Ice-contact (kame) COUNTY: Kings

EXPOSURE TYPE: Pit PARISH: Studholm

STATUS: Inactive UTM: 083 728

SECTION DESCRIPTION & COMMENTS:

0.5 m Soil

3.7 m Sandy Gravel: Fine to medium gravel and coarse sand; maximum clast size is 0.2 m.

The quality of the material is limited by its high content of friable lithotypes.

MECHANICAL ANALYSIS:

sieve		25mm	19mm	9.5mm	4.75mm	2.36mm	1.4mm	600μm	300μm	150μm	75μm
% pass.		86.3	82.9	74.7	61.2	39.8	25.1	7.3	1.8	0.8	0.4

LITHOLOGIC ANALYSIS:

Unsound Lithotypes 69%	Sound Lithotypes 31%
sandstone 33; mudstone 33; schist and gneiss 3	mafic extrusive 13; felsic extrusive 6; felsic intrusive 5; mafic intrusive 5; quartz 2

ESTIMATION OF RESERVES:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (metres)	Recoverable Reserves (m^3) Probable
	12	1.8	220 000

LOCATION:	H14-70	NTS:	21 H/14W
TYPE OF DEPOSIT:	Ice-contact	COUNTY:	Kings
EXPOSURE TYPE:	Pit	PARISH:	Studholm
STATUS:	Active-on-demand	UTM:	090 733

SECTION DESCRIPTION & COMMENTS:

0.6 m Soil

8.5 m Sand and Gravel: Interbedded to lenticular bodies of silty fine sand, medium to coarse sand, gravelly sand, and sandy fine to medium gravel; the material is extremely variable both vertically and laterally; maximum clast size is 0.1 m.

The quality of the material is limited by its relatively high fines content, and by a substantial percentage of unsound lithotypes.

The material in the large deposit to the southwest, at Smiths Creek, is probably similar.

MECHANICAL ANALYSIS:

sieve		25mm	19mm	9.5mm	4.75mm	2.36mm	1.4mm	600μm	300μm	150μm	75μm
% pass.		92.8	85.1	76.1	68.4	59.5	50.6	34.2	17.1	6.8	3.4

LITHOLOGIC ANALYSIS:

Unsound Lithotypes 39%	Sound Lithotypes 61%
sandstone 26; schist 9; weathered 4	felsic extrusive 20; mafic intrusive 10; quartzite 10; mafic extrusive 9; quartz 7; felsic intrusive 5

ESTIMATION OF RESERVES:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (metres)	Recoverable Reserves (m^3) Probable
H14-700	16	2.7	430 000
Smiths Creek	83	1.8	1.5 million

LOCATION:	H14-71	NTS:	21 H/14W
TYPE OF DEPOSIT:	Ice-contact (kame)	COUNTY:	Kings
EXPOSURE TYPE:	Pit	PARISH:	Havelock
STATUS:	Inactive	UTM:	141 793

SECTION DESCRIPTION & COMMENTS:

0.6 m Soil

2.4 m Gravelly Sand: Gravelly medium to very coarse sand; clasts are subangular to subrounded; maximum clast size is 0.1 m.

Most of the thickest portion of this deposit has been depleted. Remaining reserves are in the northern lobe of the deposit.

MECHANICAL ANALYSIS:

sieve		25mm	19mm	9.5mm	4.75mm	2.36mm	1.4mm	600µm	300µm	150µm	75µm
% pass.		100.0	99.7	91.7	80.1	57.7	39.3	18.4	10.4	5.6	4.0

LITHOLOGIC ANALYSIS:

Unsound Lithotypes 31%	Sound Lithotypes 69%
sandstone 13; siltstone 9; weathered 7; chert 2	felsic extrusive 21; mafic extrusive 17; mafic intrusive 16; felsic intrusive 13; quartz 2

ESTIMATION OF RESERVES:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (metres)	Recoverable Reserves (m^3) Probable
			Limited

LOCATION:	H14-72	NTS:	21 H/14W
TYPE OF DEPOSIT:	Glaciofluvial outwash (delta)	COUNTY:	Kings
EXPOSURE TYPE:	Pit	PARISH:	Cardwell
STATUS:	Active-on-demand	UTM:	216 761

SECTION DESCRIPTION & COMMENTS:

0.8 m Gravel: Slightly silty medium to coarse gravel (includes soil profile).

0.2 m Till: Relatively compact, fissile, gravelly sandy till.

2.4 m Sandy Gravel: Sandy medium to coarse gravel, with interbeds of medium sand; clasts are subrounded to rounded; maximum clast size is 0.1 m.

1.8 m Slump Covered: Assumed to be material as above.

MECHANICAL ANALYSIS:

sieve		25mm	19mm	9.5mm	4.75mm	2.36mm	1.4mm	600µm	300µm	150µm	75µm
% pass.		86.8	78.7	59.3	45.9	38.1	32.1	20.7	7.3	1.8	0.5

LITHOLOGIC ANALYSIS:

Unsound Lithotypes 50%	Sound Lithotypes 50%
sandstone 42; schist 5; conglomerate 2; weathered 1	mafic extrusive 17; felsic intrusive 14; felsic extrusive 8; quartzite 6; mafic intrusive 5

ESTIMATION OF RESERVES:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (metres)	Recoverable Reserves (m^3) Probable
	3 9	3.6 1.8	270 000

LOCATION:	H14-73	NTS:	21 H/14W
TYPE OF DEPOSIT:	Glaciofluvial outwash (delta)	COUNTY:	Kings
EXPOSURE TYPE:	Pit	PARISH:	Cardwell
STATUS:	Active-on-demand	UTM:	225 764

SECTION DESCRIPTION & COMMENTS:

0.6 m Soil

0.9 m Cobbly Gravel: Cobbly coarse gravel, with boulders up to 0.4 m in diameter; predominantly sandstone clasts.

0.1 m Till: Fissile, gravelly sand till, with subangular clasts.

6.0 m Sandy Gravel: Horizontally bedded, medium to coarse gravel, with lenses and interbeds of medium to coarse sand.

MECHANICAL ANALYSIS:

sieve		25mm	19mm	9.5mm	4.75mm	2.36mm	1.4mm	600µm	300µm	150µm	75µm
% pass.		90.4	80.9	59.6	40.1	28.1	20.1	10.0	2.8	0.8	0.4

LITHOLOGIC ANALYSIS:

Unsound Lithotypes 57%	Sound Lithotypes 43%
sandstone 44; schist 9; weathered 4	felsic intrusive 17; felsic extrusive 11; mafic extrusive 11; mafic intrusive 2; quartz 2

ESTIMATION OF RESERVES:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (metres)	Recoverable Reserves (m^3) Probable
	5 2.5	4.6 1.8	280 000

LOCATION:	H14-74	NTS:	21 H/14W
TYPE OF DEPOSIT:	Glaciofluvial outwash (delta)	COUNTY:	Kings
EXPOSURE TYPE:	Pit	PARISH:	Cardwell
STATUS:	Abandoned	UTM:	213 749

SECTION DESCRIPTION & COMMENTS:

0.6 m Soil: Developed in a fine to medium sand.

1.8 m Sandy Gravel: Sandy fine to medium gravel; clasts are subrounded; maximum clast size is 0.1 m.

0.6 m Slump Covered: Assumed to be material as above.

Reserves are calculated for the two areas of deltaic deposits to either side of Spring Brook.

MECHANICAL ANALYSIS:

sieve		25mm	19mm	9.5mm	4.75mm	2.36mm	1.4mm	600μm	300μm	150μm	75μm
% pass.		84.8	77.7	66.8	61.2	55.1	50.8	40.4	17.8	4.9	1.2

LITHOLOGIC ANALYSIS:

Unsound Lithotypes 58%	Sound Lithotypes 42%
sandstone 49; schist 5; weathered 4	mafic extrusive 16; felsic extrusive 13; felsic intrusive 7; mafic intrusive 3; quartz 3

ESTIMATION OF RESERVES:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (metres)	Recoverable Reserves (m^3) Probable
	15.5 17.5 24	3.7 2.7 1.8	1.5 million

LOCATION:	H14-75	NTS:	21 H/14W
TYPE OF DEPOSIT:	Glaciofluvial outwash (delta)	COUNTY:	Kings
EXPOSURE TYPE:	Road cut	PARISH:	Cardwell
STATUS:	Undeveloped	UTM:	233 763

SECTION DESCRIPTION & COMMENTS:

0.6 m Soil

0.6 m Sandy Gravel: Sandy medium to coarse gravel; maximum clast size is 0.1 m.

The above section is exposed at the top of an erosional terrace approximately 6 to 7.5 m high. Most of the terrace height probably consists of granular material.

MECHANICAL ANALYSIS:

sieve		25mm	19mm	9.5mm	4.75mm	2.36mm	1.4mm	600μm	300μm	150μm	75μm
% pass.		80.0	72.5	56.0	41.9	32.7	26.8	16.8	4.2	0.8	0.4

LITHOLOGIC ANALYSIS:

Unsound Lithotypes 57%	Sound Lithotypes 43%
sandstone 44; schist and shale 11; weathered 2	felsic extrusive 15; felsic intrusive 15; mafic extrusive 11; mafic intrusive 2

ESTIMATION OF RESERVES:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (metres)	Recoverable Reserves (m^3) Probable
	42	3.6	1.5 million

LOCATION:	H14-76	NTS:	21 H/14W
TYPE OF DEPOSIT:	Glaciofluvial outwash (delta)	COUNTY:	Kings
EXPOSURE TYPE:	Pit	PARISH:	Cardwell
STATUS:	Active-on-demand	UTM:	179 731

SECTION DESCRIPTION & COMMENTS:

0.6 m Soil

0.9 m Cobble Gravel: Coarse, massive, cobble gravel.

3.7 m Gravel: Medium to coarse gravel, with lenses and interbeds of medium sand; the material becomes finer toward the base of the section; maximum clast size is 0.2 m.

MECHANICAL ANALYSIS:

sieve		25mm	19mm	9.5mm	4.75mm	2.36mm	1.4mm	600µm	300µm	150µm	75µm
% pass.		72.5	65.6	49.7	37.3	28.7	22.8	11.9	3.0	0.8	0.4

LITHOLOGIC ANALYSIS:

Unsound Lithotypes 44%

sandstone 24; schist and shale 13; weathered 7

Sound Lithotypes 56%

felsic intrusive 17; mafic extrusive 13; mafic intrusive 13; felsic extrusive 11; quartz 2

ESTIMATION OF RESERVES:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (metres)	Recoverable Reserves (m^3) Probable
	10	3.6	360 000

LOCATION:	H14-77	**NTS:**	21 H/14W
TYPE OF DEPOSIT:	Ice-contact (kame moraine)	**COUNTY:**	Kings
EXPOSURE TYPE:	Pit	**PARISH:**	Cardwell
STATUS:	Active-on-demand	**UTM:**	175 725

SECTION DESCRIPTION & COMMENTS:

0.6 m Soil

3.6 m Gravel: Poorly stratified, silty medium to coarse gravel, with minor reddish sandy interbeds; maximum clast size is 0.1 m.

MECHANICAL ANALYSIS:

sieve		25mm	19mm	9.5mm	4.75mm	2.36mm	1.4mm	600μm	300μm	150μm	75μm
% pass.		63.6	55.2	40.6	29.5	20.1	14.5	7.4	2.4	0.9	0.3

LITHOLOGIC ANALYSIS:

Unsound Lithotypes 46%	Sound Lithotypes 54%
sandstone 31; gneiss 6; schist and shale 6; weathered 3	felsic intrusive 21; mafic extrusive 19; felsic extrusive 12; mafic intrusive 3

ESTIMATION OF RESERVES:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (metres)	Recoverable Reserves (m^3) Probable
	11	3.7	410 000

LOCATION:	H14-78	NTS:	21 H/14W
TYPE OF DEPOSIT:	Glaciofluvial outwash (delta)	COUNTY:	Kings
EXPOSURE TYPE:	Pit	PARISH:	Cardwell
STATUS:	Abandoned	UTM:	162 728

SECTION DESCRIPTION & COMMENTS:

0.6 m Soil

0.6 m Gravel: Cobbly coarse gravel; maximum clast size is 0.25 m.

3.4 m Slump Covered: Assumed to be gravel.

Limited reserves may be present in the small esker segment lying to the north of the western end of the deltaic deposit. The character of the material in the esker is unknown.

MECHANICAL ANALYSIS:

sieve		25mm	19mm	9.5mm	4.75mm	2.36mm	1.4mm	600µm	300µm	150µm	75µm
% pass.		55.5	51.0	41.2	34.6	28.7	22.8	11.1	3.5	1.0	0.4

LITHOLOGIC ANALYSIS:

Unsound Lithotypes 35%	Sound Lithotypes 65%
sandstone 23; schist and shale 6; weathered 6	felsic intrusive 24; mafic extrusive 22; felsic extrusive 13; mafic intrusive 3; quartz 3

ESTIMATION OF RESERVES:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (metres)	Recoverable Reserves (m^3) Probable
	5.5	1.8	100 000

LOCATION:	H14-79	NTS:	21 H/14W
TYPE OF DEPOSIT:	Ice-contact (kame moraine)	COUNTY:	Kings
EXPOSURE TYPE:	Pit	PARISH:	Cardwell
STATUS:	Inactive	UTM:	170 725

SECTION DESCRIPTION & COMMENTS:

0.6 m Soil

0.9 m Gravel: Medium to coarse gravel; maximum clast size is 0.2 m.

6.1 m Slump Covered: Assumed to be gravel.

The ridge in which the pit occurs is about 17 m in height. Gravel that may be in situ is present 4.5 m above the base. Consequently, the thickness estimate used in reserve calculations may be conservative.

MECHANICAL ANALYSIS:

sieve		25mm	19mm	9.5mm	4.75mm	2.36mm	1.4mm	600μm	300μm	150μm	75μm
% pass.		79.9	73.2	56.3	41.9	31.4	24.7	13.8	5.0	2.1	0.8

LITHOLOGIC ANALYSIS:

Unsound Lithotypes 38%	Sound Lithotypes 62%
sandstone 25; schist and shale 8; weathered 5	felsic intrusive 24; mafic intrusive 20; mafic extrusive 15; felsic extrusive 3

ESTIMATION OF RESERVES:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (metres)	Recoverable Reserves (m^3) Probable
	7	3.7	260 000

LOCATION:	H14-80	NTS:	21 H/14W
TYPE OF DEPOSIT:	Ice-contact (kame moraine)	COUNTY:	Kings
EXPOSURE TYPE:	Pit	PARISH:	Cardwell
STATUS:	Abandoned	UTM:	163 723

SECTION DESCRIPTION & COMMENTS:

0.6 m Soil

2.4 m Sandy Gravel: Sandy medium gravel; clasts are subrounded to rounded; maximum clast size is 0.1 m.

Most of the pit faces are heavily slumped.

MECHANICAL ANALYSIS:

sieve		25mm	19mm	9.5mm	4.75mm	2.36mm	1.4mm	600μm	300μm	150μm	75μm
% pass.		82.3	77.3	59.5	45.7	37.0	31.1	19.7	6.4	0.9	0.5

LITHOLOGIC ANALYSIS:

Unsound Lithotypes 34%	Sound Lithotypes 66%
sandstone 15; weathered 13; schist and shale 4; chert 2	felsic intrusive 19; mafic extrusive 14; felsic extrusive 13; mafic intrusive 8; hornfels and metavolcanics 8; quartzite 4

ESTIMATION OF RESERVES:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (metres)	Recoverable Reserves (m^3) Probable
			Depleted

LOCATION: H14-81 NTS: 21 H/14W

TYPE OF DEPOSIT: Alluvium (ancient) COUNTY: Kings

EXPOSURE TYPE: Pit PARISH: Cardwell

STATUS: Abandoned UTM: 165 721

SECTION DESCRIPTION & COMMENTS:

0.6 m Soil

1.2 m Gravel: Cobbly medium to very coarse gravel; maximum clast size is 0.25 m.

2.4 m Slump Covered: Partly overgrown.

Some material from this pit was crushed for use in asphalt during the construction of the Trans-Canada Highway.

MECHANICAL ANALYSIS:

sieve		25mm	19mm	9.5mm	4.75mm	2.36mm	1.4mm	600μm	300μm	150μm	75μm
% pass.		67.4	58.5	36.8	24.2	17.9	13.8	8.0	2.4	0.5	0.1

LITHOLOGIC ANALYSIS:

Unsound Lithotypes 38%	Sound Lithotypes 62%
schist and shale 19; sandstone 11; weathered 8	felsic intrusive 20; mafic intrusive 15; mafic extrusive 13; felsic extrusive 6; hornfels and metavolcanics 6; quartzite 2

ESTIMATION OF RESERVES:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (metres)	Recoverable Reserves (m^3) Probable
east of pit	7.5	2.7	200 000
west of pit	18	1.4	250 000

LOCATION:	H14-82	NTS:	21 H/14W
TYPE OF DEPOSIT:	Ice-contact (kame moraine)	COUNTY:	Kings
EXPOSURE TYPE:	Pit	PARISH:	Cardwell
STATUS:	Active-on-demand	UTM:	155 705

SECTION DESCRIPTION & COMMENTS:

0.6 m Soil

2.4 m Slump Covered

1.2 m Sandy Gravel: Slightly silty, sandy medium gravel with a few cobbles; clasts are predominantly subangular; maximum clast size is 0.15 m.

Maximum section height is 5.5 m.

MECHANICAL ANALYSIS:

sieve		25mm	19mm	9.5mm	4.75mm	2.36mm	1.4mm	600μm	300μm	150μm	75μm
% pass.		75.0	67.3	54.7	44.5	35.2	28.5	16.9	7.1	2.7	1.3

LITHOLOGIC ANALYSIS:

Unsound Lithotypes 26%

weathered 14; sandstone 6; schist and shale 6

Sound Lithotypes 74%

felsic intrusive 26; mafic extrusive 26; felsic extrusive 14; mafic intrusive 8

ESTIMATION OF RESERVES:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (metres)	Recoverable Reserves (m^3) Probable
	13	3.7	480 000

LOCATION:	H14-83	NTS:	21 H/14W
TYPE OF DEPOSIT:	Ice-contact	COUNTY:	Kings
EXPOSURE TYPE:	Pit	PARISH:	Cardwell
STATUS:	Inactive	UTM:	091 710

SECTION DESCRIPTION & COMMENTS:

0.6 m Soil

3.0 m Sand and Gravel: Interstratified clean to silty fine to medium sand, and fine to medium gravel; some of the gravel beds are also silty; maximum clast size is 0.1 m.

The material in this deposit is of poor quality. The extent of the deposit cannot be delineated on the aerial photographs.

MECHANICAL ANALYSIS: N.A.

sieve		25mm	19mm	9.5mm	4.75mm	2.36mm	1.4mm	600μm	300μm	150μm	75μm
% pass.											

LITHOLOGIC ANALYSIS: N.A.

Unsound Lithotypes	%	Sound Lithotypes	%

ESTIMATION OF RESERVES:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (metres)	Recoverable Reserves (m^3) Probable
			Limited

LOCATION:	H14-84	NTS:	21 H/14W
TYPE OF DEPOSIT:	Glaciofluvial outwash (delta)	COUNTY:	Kings
EXPOSURE TYPE:	Pit	PARISH:	Cardwell
STATUS:	Abandoned	UTM:	187 721

SECTION DESCRIPTION & COMMENTS:

0.6 m Soil

1.2 m Sandy Gravel: Sandy cobbly coarse to very coarse gravel, with boulders up to 0.4 m in size.

3.1 m Slump Covered

Two small kettle holes are present near the pit. Their depths of 6 to 7.5 m are probably indicative of the gravel thickness in this area.

Reserves are calculated for the deposit area extending southeast to Springdale.

MECHANICAL ANALYSIS:

sieve		25mm	19mm	9.5mm	4.75mm	2.36mm	1.4mm	600µm	300µm	150µm	75µm
% pass.		76.2	69.9	57.9	49.0	38.7	29.4	13.2	3.9	2.0	1.5

LITHOLOGIC ANALYSIS:

Unsound Lithotypes 45%	Sound Lithotypes 55%
sandstone 35; schist and shale 5; weathered 3; chert 2	felsic intrusive 16; mafic extrusive 11; mafic intrusive 11; felsic extrusive 10; metavolcanic 5; quartz 2

ESTIMATION OF RESERVES:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (metres)	Recoverable Reserves (m^3) Probable
	3 20	2.7 5.5	1.2 million

LOCATION:	H14-85	NTS:	21 H/14W
TYPE OF DEPOSIT:	Glaciofluvial outwash (delta)	COUNTY:	Kings
EXPOSURE TYPE:	Pit	PARISH:	Cardwell
STATUS:	Inactive	UTM:	183 721

SECTION DESCRIPTION & COMMENTS:

0.6 m Soil

0.9 m Cobbly Gravel: Cobbly coarse gravel; maximum clast size is 0.25 m.

3.7 m Slump Covered: Material becomes finer with depth, according to the owner.

MECHANICAL ANALYSIS:

sieve		25mm	19mm	9.5mm	4.75mm	2.36mm	1.4mm	600µm	300µm	150µm	75µm
% pass.		61.1	55.5	41.5	30.6	17.8	10.1	3.7	1.2	0.4	0.2

LITHOLOGIC ANALYSIS:

Unsound Lithotypes 54%	Sound Lithotypes 46%
sandstone 35; weathered 12; schist and shale 7	mafic intrusive 18; felsic intrusive 12; mafic extrusive 7; metavolcanic 7; felsic extrusive 1; quartz 1

ESTIMATION OF RESERVES:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (metres)	Recoverable Reserves (m^3) Probable
	7	3.7	260 000

LOCATION:	H14-86	NTS:	21 H/14W
TYPE OF DEPOSIT:	Glaciofluvial outwash (delta)	COUNTY:	Kings
EXPOSURE TYPE:	Pit	PARISH:	Cardwell
STATUS:	Abandoned	UTM:	198 705

SECTION DESCRIPTION & COMMENTS:

0.6 m Soil

0.9 m Cobbly Gravel: Cobbly coarse gravel, with boulders up to 0.4 m in size.

5.2 m Slump Covered: Material is less coarse at depth, according to the owner.

Although sandstone represents a large percentage of the component clasts, most of it is relatively hard.

Reserves are estimated only for the deposit area southeast of Springdale. Reserves have also been calculated for the adjacent ancient alluvial deposits.

MECHANICAL ANALYSIS:

sieve		25mm	19mm	9.5mm	4.75mm	2.36mm	1.4mm	600µm	300µm	150µm	75µm
% pass.		78.0	68.3	45.6	30.3	17.8	11.5	4.6	1.8	0.6	0.3

LITHOLOGIC ANALYSIS:

Unsound Lithotypes 50%	Sound Lithotypes 50%
sandstone 42; schist and shale 6; weathered 2	mafic intrusive 16; felsic intrusive 13; mafic extrusive 11; metavolcanic 6; felsic extrusive 4

ESTIMATION OF RESERVES:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (metres)	Recoverable Reserves (m^3) Probable
deltaic deposit	5.5	3.7	200 000
ancient alluvium	12	1.8	220 000

LOCATION:	H14-87	**NTS:**	21 H/14W
TYPE OF DEPOSIT:	Glaciofluvial outwash (delta)	**COUNTY:**	Kings
EXPOSURE TYPE:	Pit	**PARISH:**	Cardwell
STATUS:	Abandoned	**UTM:**	242 772

SECTION DESCRIPTION & COMMENTS:

0.6 m Soil: Developed in a coarse gravel; lightly compacted, silty and till-like at the base.

0.9 m Gravel: Clean medium to coarse gravel; clasts are subangular to subrounded; maximum clast size is 0.1 m.

3.4 m Slump Covered: Assumed to be gravel as above.

MECHANICAL ANALYSIS:

sieve		25mm	19mm	9.5mm	4.75mm	2.36mm	1.4mm	600µm	300µm	150µm	75µm
% pass.		82.4	72.5	53.5	39.3	25.6	18.9	10.6	3.1	0.8	0.4

LITHOLOGIC ANALYSIS:

Unsound Lithotypes 66%	Sound Lithotypes 34%
sandstone 50; schist and shale 14; weathered 2	felsic intrusive 8; mafic extrusive 8; metavolcanic 6; felsic extrusive 5; mafic intrusive 5; quartzite 2

ESTIMATION OF RESERVES:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (metres)	Recoverable Reserves (m^3) Probable
	62	2.7	1.7 million

LOCATION:	H14-88	NTS:	21 H/14W
TYPE OF DEPOSIT:	Glaciofluvial outwash (delta)	COUNTY:	Kings
EXPOSURE TYPE:	Backhoe excavation	PARISH:	Cardwell
STATUS:	Undeveloped	UTM:	186 740

SECTION DESCRIPTION & COMMENTS:

0.6 m Soil

2.4 m Gravel: Well-stratified, clean, cobbly coarse gravel; clasts are predominantly subrounded; maximum clast size is 0.15 m; the upper part of the unit tends to be coarser than the lower part, and has a higher concentration of sandstone clasts.

Overall soundness of the deposit appears to be moderately good, despite the relatively high sandstone content.

MECHANICAL ANALYSIS:

sieve		25mm	19mm	9.5mm	4.75mm	2.36mm	1.4mm	600µm	300µm	150µm	75µm
% pass.		65.9	59.2	45.1	35.3	27.8	20.8	13.1	4.6	0.7	0.4

LITHOLOGIC ANALYSIS:

Unsound Lithotypes 49%	Sound Lithotypes 51%
sandstone 37; schist 7; weathered 5	felsic intrusive 17; mafic intrusive 14; metavolcanic 10; mafic extrusive 6; felsic extrusive 2; quartzite 2

ESTIMATION OF RESERVES:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (metres)	Recoverable Reserves (m^3) Probable
	23	2.7	620 000

LOCATION:	H14-89	**NTS:**	21 H/14W
TYPE OF DEPOSIT:	Ice-contact (esker)	**COUNTY:**	Kings
EXPOSURE TYPE:	Pit	**PARISH:**	Studholm
STATUS:	Abandoned	**UTM:**	066 864

SECTION DESCRIPTION & COMMENTS:

Most of the faces in this old pit have slumped, and are overgrown. Face heights are in the range of 3 to 3.7 m. The material appears to be a cobbly coarse gravel. Clasts are subangular to subrounded; maximum clast size is 0.1 m. Soil thickness is 0.6 m.

This deposit has the form of a low, flattened ridge, probably an esker deformed by overriding glacial ice. Reserves are also estimated for the small outwash deposits nearby.

MECHANICAL ANALYSIS:

sieve		25mm	19mm	9.5mm	4.75mm	2.36mm	1.4mm	600µm	300µm	150µm	75µm
% pass.		71.1	65.0	52.9	41.2	29.3	20.6	8.2	2.5	1.0	0.4

LITHOLOGIC ANALYSIS:

Unsound Lithotypes 29%	Sound Lithotypes 71%
schist 15; sandstone 12; weathered 2	hornfels and metavolcanics 20; quartzite and quartz 13; mafic extrusive 12; felsic extrusive 10; felsic intrusive 10; mafic intrusive 6

ESTIMATION OF RESERVES:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (metres)	Recoverable Reserves (m^3) Probable
ice-contact	10	2.3	230 000
outwash	6	1.8	110 000

LOCATION:	H14-90	NTS:	21 H/14W
TYPE OF DEPOSIT:	Ice-contact (kame moraine)	COUNTY:	Kings
EXPOSURE TYPE:	Backhoe excavation	PARISH:	Cardwell
STATUS:	Undeveloped	UTM:	160 709

SECTION DESCRIPTION & COMMENTS:

0.6 m Soil

2.4 m Sandy Gravel: Cobbly sandy coarse gravel, with a moderately high fines content; maximum clast size is 0.25 m.

The relief exhibited by this deposit reaches 15 to 18 m. Consequently, the estimated average thickness may be conservative. However, material characteristics at depth are unknown.

MECHANICAL ANALYSIS:

sieve		25mm	19mm	9.5mm	4.75mm	2.36mm	1.4mm	600μm	300μm	150μm	75μm
% pass.		82.9	75.3	60.9	47.8	35.4	25.8	12.4	4.3	1.9	1.0

LITHOLOGIC ANALYSIS:

Unsound Lithotypes 27%	Sound Lithotypes 73%
weathered 13; schist 8; sandstone 6	felsic intrusive 31; felsic extrusive 16; mafic extrusive 16; mafic intrusive 5; metavolcanic 5

ESTIMATION OF RESERVES:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (metres)	Recoverable Reserves (m^3) Probable
	43	5.5	2.4 million

LOCATION:	H14-91	NTS:	21 H/14W
TYPE OF DEPOSIT:	Ice-contact (kame terrace)	COUNTY:	Kings
EXPOSURE TYPE:	Road cut	PARISH:	Cardwell
STATUS:	Undeveloped	UTM:	218 743

SECTION DESCRIPTION & COMMENTS:

A road cut along a woods road at this site exposes approximately 2 m of ice-contact gravel. The terrace height is in the order of 6 to 7.5 m, and is a rough indication of the maximum thickness of workable material.

Road cuts throughout the deposit area typically expose more than 0.5 m of silty ice-contact gravel. The character of the material at depth is unknown.

MECHANICAL ANALYSIS: N.A.

sieve		25mm	19mm	9.5mm	4.75mm	2.36mm	1.4mm	600µm	300µm	150µm	75µm
% pass.											

LITHOLOGIC ANALYSIS: N.A.

Unsound Lithotypes	%	Sound Lithotypes	%

ESTIMATION OF RESERVES:

Total Deposit Area (hectares)	Area Workable (hectares)	Average Thickness (metres)	Recoverable Reserves (m^3) Probable
	20 35	3.7 2.7	1.7 million